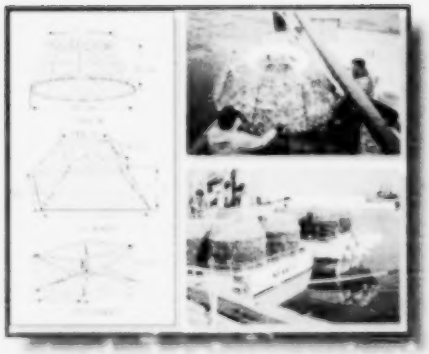
Overview of the Atlantic Snow Crab Industry

Submitted to:
Department of Fisheries and Oceans
and
Atlantic Council of Fisheries and Aquaculture Ministers

Submitted by:
Gardner Pinfold



Source: DFO

June 2006

TABLE OF CONTENTS

		Page
Summary		i
I	About This Report	1
	1. Background	1
	2. Issues	2
	3. Objectives	2
	4. Contents	2
II	Resource and Stock Status	3
	1. Habitat and biology	3
	2. Development and management of the fishery	4
	3. Stock Status	5
	4. Issues and challenges	7
III	Snow Crab Market	11
	1. Overview	11
	2. Global demand and supply	11
	3. Markets	13
	4. Issues and Challenges	18
IV	Harvesting Sector	21
	1. Overview	21
	2. Licencing – trends in access to the fishery	23
	3. The snow crab fishery – landings and seasons	27
	4. Fleet economics	33
	5. Issues and challenges	39
V	Processing and Marketing	41
	1. Overview	41
	2. Sector profile	42
	3. Competition	47
	4. Issues and challenges	54
VI	Industry Overview	57
	1. Issues	57
	2. Resource – cyclical abundance	57
	3. Markets – narrow and price sensitive	59
	4. Harvesting – prone to wide revenue swings	61
	5. Processing – structured to under-perform	63
Bibliography		65

SUMMARY

State of the industry

The snow crab industry in some parts of the Atlantic Provinces and Québec faced major challenges in 2005 and 2006, following several years of sustained growth. The industry is expected to generate over $450 million *less* in export earnings in 2006 than it did in 2004.

Between 1997 and 2004, the value of snow crab landings tripled, rising from $200 to $600 million. Crab had become the most valuable species on the East Coast, surpassing even lobster. Over this same period, the value of crab exports increased from $350 to $863 million.

A reversal in each of the factors contributing to growth – resource, markets and exchange rates – caused landed value to drop to $280 million in 2005, and exports to decline to about $600 million. Further weakness in 2006 is expected to cause the value of landings to drop to the $235 million range, with exports down to about $400 million.

The snow crab industry generates direct employment and income for an estimated 22,000 people during the peak of the season. Harvesting and processing also generate indirect employment and income across a range of support industries.

Resource

There is a limited basis for short-term optimism about growth in snow crab abundance. The overall TAC in 2007 may decline from the 2006 level, the net result of increases and declines in abundance of the various crab populations. No area is experiencing a strong recruitment pulse that would provide the basis for significant growth in exploitable biomass in the next 2-3 years.

- **Newfoundland and Labrador** - Biomass indices have declined in several areas, and while short-term recruitment has improved in some areas, long-term recruitment prospects are uncertain. DFO is following a cautious approach in setting the TAC.

- **Eastern Nova Scotia** - abundance (fishable biomass) has declined since 2001, the result of weak recruitment. Recruitment has been weak for the past few years. Recovery could begin as early as 2007, though this is dependent on reducing fishing pressure on immature and soft-shelled crab in 2006.

- **Southern Gulf of St. Lawrence** - the stock is in a declining phase in recruitment to the fishery until 2010 resulting in a 20% lower TAC in 2006. Reduced TACs can be expected for the next few years.

- **Northern Gulf of St. Lawrence** - most populations are nearing the end of a recruitment wave, reflected in high commercial biomass and weak recruitment. It is likely that exploitable biomass will begin to decline in 2007.

Markets

The Atlantic snow crab industry relies essentially on two markets: the U.S. and Japan. Both markets weakened in 2005 following a three-year run-up of prices. A combination of price resistance by food service and retail companies and the availability of substitutes for snow crab caused wholesale prices to fall. Prices paid to processing companies (FOB Boston) dropped from CAN$5.90/lb in late 2004 to CAN$3.20/lb in early 2005, a drop of 45% (including the exchange rate impact).

Prices received by processors continued in the CAN$3.20/lb range throughout the 2006 season. There are some indications that prices are beginning to strengthen as inventories decline. The market will sustain higher prices as it has in the past, but whether prices move up in 2007 will depend on several factors including overall snow crab supplies, supplies of substitutes and economic conditions in the major markets.

The fisheries of six countries supply the snow crab market estimated at 150,000 t, with Canada accounting for about two-thirds of the total. The Alaska fishery represents the greatest potential source of competition for Canada. The 2006 Alaska fishery produced about 16,000 t and may be on the edge of a recovery. Twice in the past 15 years landings have increased sharply, exceeding 100,000 t at peak. The prospect of a recovery to even half this level represents the greatest threat facing the Canadian industry since it would greatly undermine any upward movement of prices.

Harvesting

The harvesting sector had enjoyed several years of rising catches and strong prices prior to 2005. Sharply declining prices and rising harvesting costs have caused margins to narrow considerably for many fleets.

Snow crab ranks behind lobster as the most important species in the Atlantic fisheries. The 4,000 licence-holders with access to the fishery are highly dependent on the fishery. With the exception of 2-3 fleets, the gross revenue from crab exceeds 60% of total fishing revenue. Dependence in most areas ranges between 75 and 100%.

Fishing seasons tend to be short, often no more than 6-8 weeks. For conservation reasons, the seasons would be at best no longer than 12-14 weeks. But harvesters try to catch their quotas in as short a time as possible. They need income, they want to fish when catch rates are highest, they want to avoid the risk of closure due to soft-shell crab, and they want to ensure the highest quality catch (including the possibility of high-grading).

Processing

The region's 80 or so processing plants employ over 10,000 people at peak and produce essentially a single product: crab sections. The U.S. is the dominant market, taking about 70% of exports.

The crab industry is structured to under-perform. Unlike most other industries, production decisions are made in response to supply conditions, rather than market demand. All key decisions taken by the processing sector, whether on capacity, raw material purchasing (rate, quantity and quality), production schedules or product sales, are subordinate to operating conditions in the harvesting sector.

The main implication of these structural and operating constraints is that processors are forced to take the market as they find it on a day-to-day basis. They have little or no ability to plan or work out marketing arrangements with customers that could result in higher prices. They rely on importers and distributors to channel their output. In short, they are unable to be market-driven – to work from the market back to production. All their decisions are based on supply conditions.

As such, the main driver is the need for cash to pay for raw material. To put this in perspective, the processing sector had to generate over *$600 million* in 2004, most of this in the space of just 6-8 weeks. This places considerable pressure on processors to turn over product as soon as possible. This leaves no room for product or market development. Moreover, undisciplined selling limits the bargaining strength they would have with importers and distributors.

Knowledge gaps

In their various roles as resource stewards, fishery managers, industry regulators, human resource planners and community development agencies, governments rely on timely and accurate information to carry out their responsibilities. Among the key areas where information is lacking or inadequate:

- **Resource** - effect of high exploitation rates; impact of fishing over the entire range of distribution; effects of harvesting high proportion of large males; and how fishing pressure in one area affects crab populations in other areas.

- **Market** - predictions of global supplies of snow crab and substitutes; information on market or product potential in markets outside the U.S. and Japan; market potential in Canada.

- **Harvesting** - cost and earnings data that would provide insights into fleet viability under varying quantity and price assumptions; reliable data on availability of crews and crew earnings.

- **Processing** - financial data or other indicators of the health of the sector; comprehensive industry statistics on capacity, throughput and employment; market information including demand trends and prices; and reliable information on challenges plants face in securing labour to staff plants.

I

ABOUT THIS REPORT

1. Background

The snow crab industry in the Atlantic Provinces and Québec faced major challenges in 2005 and 2006, following several years of sustained growth.

Between 1997 and 2004, the value of landings tripled, rising from $200 to $600 million. Snow crab had become the most valuable species on the East Coast, surpassing even lobster. Over this same period, the value of crab exports increased from $350 to $863 million (Table 1.1). The crab industry generates employment and income for some 22,000 people, 12,000 in harvesting and 10,000 in processing.

Several factors during the late 1990s and early 2000s contributed to this growth. Crab stocks increased in most areas, particularly in the waters off Newfoundland and Labrador and eastern Nova Scotia. Markets for Canadian snow crab strengthened, driving up prices following a collapse of the Alaska crab fisheries in 1999. The value of the U.S. dollar increased up to 2003, so that exporters were earning $1.50 (Canadian) for each dollar of exports to the U.S.

Table 1.1: Change in key factors affecting the Atlantic Canada snow crab industry

	2004	2005p	2006p	% decline '04 to '06
Landings (t)	103,350	87,260	89,400	13%
Shore price ($/kg)	5.93	3.39	2.64	55%
Landed value ($000s)	612,875	278,612	236,000	61%
Export price (US$/kg)	9.00	7.30	6.30	30%
Exchange rate (CAN$/US$)	1.30	1.21	1.13	12%
Export price (CAN$/kg)	11.70	8.83	7.18	39%
Export value (CAN$000s)	863,000	606,000	400,000	54%

Source: DFO, Statistics Canada, U.S. National Marine Fisheries Service, Bank of Canada
Note: data for 2005 and 2006 are preliminary

An about turn in each of these factors contributed to the steepness of the decline. TACs fell in most areas in 2005, and when coupled with a sharp drop in prices, caused the overall value of landings to drop by more than half to less than $280 million. In other words, over $300 million disappeared from the gross incomes of harvesters. Net incomes were more seriously affected, given the sharp increases in costs of fuel and bait. The value of exports dropped to $600 million, a decline of 30%.

The slide continued into 2006. Overall landings are likely to be up slightly from 2005, but shore prices continued to decline, reflecting continued weakness in major markets. Also, costs, especially fuel, have continued to rise. Though final data are not in, the total value of landings is expected to decline to some $236 million in 2006 (a decline of over 60% since 2004). Adding to the weakness in markets (both U.S. and Japan) is the declining value of the U.S. dollar. The value of exports is expected to drop in 2006 to an estimated $400 million (down about 54% from 2004).

2. Issues

The issues facing the industry align fairly closely with the factors contributing to the recent difficulties. Each of these is addressed in the report in some detail:

- **Resource sustainability**: the questions concern the uncertainties surrounding estimating biomass, impact of high exploitation rates on stock structure, seasons and the incidence of soft-shell crab.
- **Fishery-driven industry**: the processing and selling of crab respond to supply pressures rather than market conditions creating cash flow challenges for processors and limiting the possibility for market and product development.
- **Market structure**: the industry relies almost exclusively on two markets, the U.S. and Japan, leaving it vulnerable to the growing power of fewer, larger importing and distribution companies.
- **Competing fisheries**: overall supply of snow crab and substitute crab products are the main factors contributing to price swings. The major sources of competition (and uncertainty) are the Alaskan and Russian snow crab fisheries, and the U.S. fisheries for Dungeness and other crab species.
- **Harvesting costs**: these have risen over the past few years due to sharp increases in fuel and bait prices. With shore prices approaching breakeven levels for some fleet sectors, vessels face difficult operating decisions including reducing crew size and/or wages and reducing the number of trips (thereby intensifying supply and quality problems).

3. Objectives

The Atlantic Council of Fisheries and Aquaculture Ministers (ACFAM) created a Snow Crab Task Group to address the issues facing the sector. Its main objectives are to provide an integrated overview of the snow crab industry, and if instructed, to identify approaches and mechanisms that could possibly be considered in developing policy to address the issues and challenges facing the industry.

This report responds to the first requirement, namely, to provide ACFAM with a comprehensive, coherent and up-to-date profile of the crab industry in Atlantic Canada covering the 1995-2005 period. The specific objectives are to provide overviews of each component of the snow crab industry using a regional or provincial focus as appropriate, but ensuring that the data can be rolled up to a provincial level.

4. Contents

Following this introduction, Chapter II provides an overview of resource conditions, examining trends in stock status, including effort, exploitation rates, recruitment and biomass. Markets are the focus of Chapter III, with detail on global supply and demand of snow crab and substitutes along with a close look at market structure in the U.S. and Japan. Chapter IV contains a profile of the harvesting sector, providing fleet profiles and fishery data by province, and outlining key issues and challenges. The processing sector is reviewed in Chapter V, with a look at industry structure, raw material supply, production and employment, and key issues and challenges. And finally, Chapter VI draws the various threads together with an overall assessment of industry issues, challenges and opportunities and the policy implications thereof.

II

RESOURCE AND STOCK STATUS

1. Habitat and biology

A 2005 report by the Fisheries Resource Conservation Council (FRCC) provides an excellent overview of snow crab biology and management issues.* For this reason, there is no need to go into detail here, though some key points made in that report are worth noting. These points have a bearing on when and how the fishery is conducted throughout the Atlantic region, and they also raise some concerns for its future management.

- The snow crab is widely distributed in northern waters, with active fisheries in the northwest Atlantic including the Gulf of St. Lawrence, the north Pacific including the Bering Sea, the Arctic Ocean and the Sea of Japan. The species is typically found on sandy or muddy bottom conditions in water temperatures ranging from -1 to 5°C. Snow crab is ordinarily found in commercial quantities at depths between 60 and 280 m.

- Only males are harvested. It takes 8-10 years for a male to reach legal size (95 mm carapace width), moulting annually until it reaches maturity (when the claws enlarge). This may occur at sizes ranging up to 140 mm. Once it reaches maturity it stops growing. The full life cycle is about 15 years.

- Eggs produced by females are carried for up to two years and then between April and June are released into the water column where they drift with the currents for 2-8 months until they reach a carapace width of 3 mm and then settle on the bottom. They go through a series of moults, growing about 20% each time.

- Following moulting, juvenile crabs go though a period of several months while their shells harden. During this time, the crab's underside is whitish in colour and has to be handled carefully to minimize handling mortality, hence the closure of fisheries when the incidence of white-shell crab reaches a prescribed proportion – 20% – of the catch in a defined area. The white-shelled crab also has low meat content and is of no commercial value.

- The stock structure for snow crab is not well defined. The management units (e.g., 12, 19, 24) do not all conform to self-sustaining biological units that produce their own eggs, larvae, recruits and spawners. It is believed that some areas act as sources, supplying larvae that at carried by currents to other areas (sinks) where the crab settle and grow. The limited data on migration suggests it is in the order of tens of kilometres per year.

- Snow crab is acknowledged to be a cyclical resource with periods of high and low abundance due to such factors as environmental change, stock structure (male-female numbers), changes in predator-prey numbers. Fishing pressure could intensify the cycles.

---

* FRCC. 2005. *Strategic Conservation Framework for Atlantic Snow Crab.*

- The fishery in many areas is characterized by increasing effort, high exploitation rates, declining catch per unit of effort, and pressure from the industry to maintain TACs at unsustainably high levels. These conditions pose considerable risk for the biological and economic components of sustainability.

Taking these and other biological factors into consideration, and allowing for the considerable uncertainty that exits in the understanding of various factors influencing abundance, the FRCC goes on to make several recommendations in its report. The following three are of particular significance in light of current conditions in the fishery.

- Snow crab seasons should be established with set opening (as close as possible to April 1) and closing dates (as close as possible to July 15). This would reduce conservation concerns in two ways. First, it avoids the late winter-early spring mating period for first-time spawners. Second, it limits the risk of fishing while there is a high incidence of soft-shell crab in the summer post-moult period. Soft-shell crab represents the recruitment to the fishery and should not be handled during this vulnerable stage.

- Biomass and exploitation rate targets and limits should be developed in order to provide the basis for an objective decision making framework. These targets and limits would be based on appropriate biological units. Adopting a target and limit approach would reduce the scope for bias and ad hoc decision-making and would improve the prospects for sustainability.

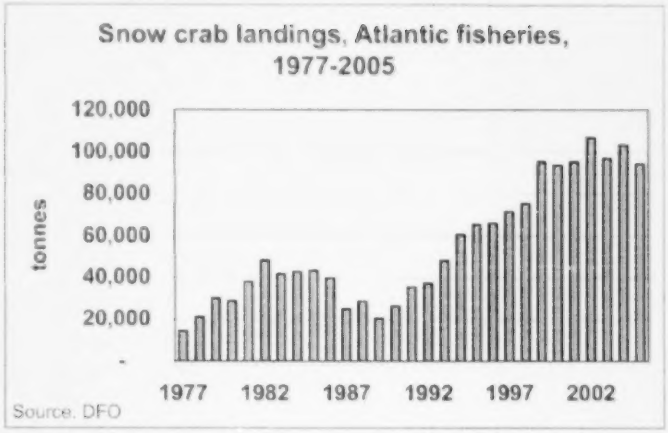
- Steps should be taken to address relatively high fishing capacity – one of the main sources of pressure leading to unsustainable harvest levels and poor fishing practices. Introducing some form of transferable fishing entitlement (e.g., ITQ) would provide a basis for capacity reduction.

2. Development and management of the fishery

The snow crab fishery began as a localized fishery in the southern Gulf of St. Lawrence in mid-1960s, and within a decade had spread throughout the Gulf as fleets developed and the wide distribution of the population was discovered. Crab began to be fished in the waters off Newfoundland and Labrador in the late 1960s, and by the late 1970s had evolved into a major fishery with limited entry and relatively stable fleets. Total landings had not yet reached 20,000 t (Fig. 2.1).

Management of the fishery took shape in the early 1970s. Regulations were introduced setting the minimum legal size (95 mm carapace width), limiting fishing gear to traps (trawls were banned), and setting a minimum mesh size so that females could escape. Gradually other conservation measures were introduced, including restrictions on harvesting soft-shelled crab, fishing seasons, and the introduction of catch limits in the form of area-based Total Allowable Catches (TACs).

Fig. 2.1: The fishery expanded slowly through the 1970s, landing 20,000 t by 1978. Landings more than doubled by 1982, stabilized for a few years, and then declined sharply due mainly to a collapse in the Gulf of St. Lawrence. Since 1988, landings have increased five-fold, exceeding 100,000 t in 2002. The Newfoundland fishery accounts for much of this increase.



3. Stock status

Basis of the estimates

Scientific advice on the status of the snow crab resource in the various crab fishing areas forms the basis of TACs set by fisheries managers. DFO scientists prepare stock advisory reports (SAR) annually, taking into consideration fishery dependent and independent data. Fishery dependent data captures information from actual experience in the fishery, including catch and effort data provided by harvesters, catch sampling data from observers and information obtained from dockside monitoring programs. Fishery independent data captures the results of scientific surveys (trap or trawl surveys) conducted by scientists.

Using these sources of data, scientists generate annual estimates of key indicators of the health of the commercial crab population including: fishing effort (usually measured as the number of trap-hauls in a defined period), catch per unit of effort (kg caught trap-haul or CPUE), stock abundance (total exploitable biomass), and recruitment trends (estimates of the number of crabs approaching or reaching minimum legal size and therefore eligible to be fished).

The certainty with which stock abundance and changes in abundance can be estimated depends on the quality of the underlying data, and this varies widely across the Atlantic region. Where bottom conditions allow trawl surveys to be conducted, such as in the Gulf of St. Lawrence, biomass estimates can be estimated with reasonable confidence. But areas with more difficult seabed conditions, such as some areas of Newfoundland and Labrador, conducting trawl surveys is problematic, and so scientists rely on indirect indicators (CPUE, recruitment and mortality estimates) to develop an index of exploitable biomass.

In light of these limitations, stock advisory reports provide sufficient information to gauge prospects for the fishery for no more than a year or two into the future. The biomass estimate or index provides the basis for setting TACs, with recruitment data influencing the TAC decision by providing a basis for looking ahead to see how biomass may change. Bearing in mind the cyclical nature of crab populations, recruitment forms an important leading indicator of turning points in resource abundance.

Summary of stock advisory reports

A review of the 2006 stock status reports provides limited basis for short-term optimism. The overall TAC may decline from the 2006 level, reflecting a mix of stability, modest increase and possible decline, depending on area. No area is experiencing a strong recruitment pulse that would provide the basis for significant growth in exploitable biomass in the next 2-3 years. A summary of key indicators is provided in Table 2.1, with general conclusions by region set out below:

- **Newfoundland and Labrador**: the TAC reached 61,500 t in 1999 following steady growth of the fishery into offshore areas. The TAC declined thereafter, and with some fluctuation dropped to 46,233 t in 2006. Biomass indices have declined in several areas, and while short-term recruitment has improved in some areas, long-term recruitment prospects are uncertain. DFO is following cautious approach in setting the TAC and has introduced new management measures following the advice of the FRCC in its 2005 report. These measures include earlier season start and end to reduce mortality due to soft-shell, and enhanced soft-shell crab monitoring.

- **Eastern Nova Scotia**: abundance (fishable biomass) has declined since 2001, and continues to decline despite reductions in the TAC (these have declined by about 50% between 2004 and 2006). Recruitment into the fishery has been weak for the past few years. Recovery could begin as early as 2007, though this is dependent on reducing fishing pressure on immature and soft-shelled crab in 2006. A lower exploitation rate coupled with a more stringent soft-shell crab protocol would result in lower TACs in the short-term, but provide the basis for growth in the future.

- **Southern Gulf of St. Lawrence**: the stock is in a declining phase in recruitment to the fishery until 2010. The TAC was set at 25,869 t in 2006 (a 20% drop from 32,336 t in 2005), and lower TACs can be expected for the next few years. Since about 2000, the fishery has become largely dependent on annual recruitment rather than remaining biomass, reflecting relatively high fishing pressure on the resource. Continued high fishing pressure on the recruitment would accelerate the decline in the commercial biomass after 2006 and require aggressive management in future years to restore abundance.

- **Northern Gulf of St. Lawrence**: most populations are nearing the end of a recruitment wave, reflected in high commercial biomass and weak recruitment. TACs remained stable in the years 2003-2006 (in the 6-7,000t range), following a sharp drop from 2002 when the TAC was over 10,000 t. It is likely that exploitable biomass will begin to decline in 2007.

Table 2.1: Atlantic snow crab stock status summary, 2006

	TAC (2006)	Exploitation rate	Effort trend 2001-2005	CPUE trend 2001-2005	Exploitable biomass	Softshell incidence	Recruitment trend
Newfoundland & Labrador							
2J	down	index down	declining	declining	low rising	high	rising
3K	down	index stable	declining	declining	declining	high	weak
3L	down	index stable	rising	declining	uncertain	low/stable	weak
3NO	down	unknown	rising	declining	uncertain	low/stable	declining
3Ps	down	unknown	declining	declining	uncertain	high	rising
3Pn	down	unknown	declining	declining	uncertain	uncertain	uncertain
4R	stable	unknown	uncertain	uncertain	uncertain	low	uncertain
Quebec							
12ABC	stable down	n.a	n.a	rising	uncertain	low	declining
13	moratorium	-	-	-	-	-	-
14	stable	n.a	n.a	declining	peak	low	declining
15	up	n.a	n.a	rising	rising	low	declining
16	stable	n.a	n.a	rising	peak	low	declining
17	stable	n.a	n.a	rising	peak	low	declining
Gulf							
12, EF	stable	45%	rising	rising	peak	low	declining
19	declining	63%	rising	variable	declining	high	declining
Scotia Fundy							
20-22	declining	30%	rising	declining	declining	high	weak
23	declining	25%	declining	stable	declining	high	weak
24	declining	25%	declining	stable	declining	high	weak

Source: DFO Canadian Science Advisory Secretariat, Stock Status Reports 2006

4. Issues and challenges

Key points

- What is known about crab biology provides the basis of management measures including minimum size, harvesting males only, seasons and avoiding the capture of soft-shell crabs. But much is unknown and this poses a threat to snow crab conservation. Among the areas of uncertainty identified by the FRCC are the effect of:
  - high exploitation rates on the number of males available for mating (depletion of mature males may leave too few to mate with available females)
  - high exploitation rates on the size at maturity of males (small crab reach terminal moult below the commercial size and not be available to the fishery)
  - exploitation over the entire range of the species in Canadian waters (this leaves no reserve of buffer against over-fishing)
  - harvesting a high proportion of large males (may result in genetic change, shifting the population to sizes below the current commercial size)
  - differences in abundance of males and females (not enough males to mate with available females
  - poor understanding of stock structure (a high exploitation rate in one area could have a detrimental effect on the population in another area).

- Experience shows that snow crab fisheries run the risk of collapse if not managed to prevent unsustainable fishing practices. Even using many of the same management measures currently used in the Atlantic snow crab fishery did not prevent the collapse of the Bering Sea snow crab stock. Over-fishing and irresponsible fishing practices such as high-grading may have contributed to the collapse.

- Snow crab biology provides a strong case for limiting the fishing season to three months (April 15 to July 15). The FRCC has recommended that fishing not commence until after mating season (late winter-early spring) and should end before soft-shell crabs are prevalent (late spring-early summer).

- Many scientists believe crab stocks follow a 10-12 year cycle of growth and decline in abundance, with 5-6 years of strong recruitment followed by 5-6 years of weak recruitment. What factors account for this is not known, though scientists believe that fishing pressure could intensify the cycles.

- There appears to be little prospect for an increase in Atlantic snow crab landings in the short term. The Atlantic crab fisheries are at different points in the cycle.
    - The population off Newfoundland and Labrador peaked a few years ago and has declined. Recruitment has improved in some areas but is generally still weak. Any recovery seems to be at least 1-2 years away.
    - The population off eastern Nova Scotia has declined and recruitment continues to be weak. Recovery could begin in 1-2 years, but depends on short-term exploitation rates.
    - The population in the southern Gulf appear to have peaked and is expected to decline until 2010 at the earliest. This means lower TACs for the next few years.
    - The stocks in the northern Gulf are nearing the end of a recruitment wave and are expected to decline over the next few years.

Challenges

Resource issues affect both DFO as steward of the resource and regulator of the industry, and the industry itself also as steward of the resource and as the major beneficiary of access to it.

For DFO, the challenge is to manage for resource conservation and sustainability, and to resist the short-term pressures for increased access and higher TACs. The current management regime, with its array of restrictions and controls, provides the Department with all the tools it needs to meet conservation and sustainability goals. But experience shows that this is not enough to ensure sustainability.

At issue is whether the Department has the knowledge and support from industry it needs to apply these tools effectively. In its 2005 report, the FRCC cites several areas where important biological knowledge is lacking. This underscores the need for caution in setting TACs (and resisting the pressure to set them at levels inconsistent with sustainability principles). It also highlights the need for investing in improved scientific research into population dynamics and abundance. Effective application of conservation measures also requires support from industry. This means strict observance of stringent soft-shell protocols, proper discard handling, no high-grading, no illegal fishing and effective at-sea monitoring.

The immediate challenge for industry is to deal with the decline in resource abundance at a time when markets are weak and costs rising. The challenge varies by fleet sector depending on the size of individual quotas and the cost structure. Many enterprises with smaller quotas are likely to face a difficult operating environment until resource and market conditions improve. Putting pressure on government to increase TACs or to engage in illegal harvesting practices may provide short-term relief, but industry is likely pay a high price in terms of conservation and sustainability.

The more general challenge facing industry is to be able to adjust to the inevitable ups and downs in resource and market conditions. This is not strictly a resource issue, but it carries implications for the resource because of the inevitable demands in a downturn for higher TACs. With the exception of a very few of the crab fisheries, the harvesting sector lacks a mechanism facilitating automatic adjustment to match capacity (cost) with resource availability (revenue). Tradable quotas or units of capacity could form the basis of such a mechanism. Government and industry may wish to consider this.

III

SNOW CRAB MARKET

1. Overview

This chapter examines the conditions of demand and supply in the international market for snow crab. The market is narrow in two senses: snow crab is consumed primarily in two countries, the U.S. and Japan, and it is consumed mainly on a commodity basis. Limited effort has been made to expand the market beyond these areas.

Demand is met by production from just six countries, of which Canada is by far the largest. Yet, Canada seems to have limited market power. In part this is due to the small scale of many enterprises and the fragmented nature of the industry. Most participants see their competition as the plant in the next harbour, rather than the distributor to whom they are selling.

These factors contribute to a certain fragility in the industry. Demand is highly price-sensitive, leaving the industry open to wide price swings in response to shifts in supply. Such swings have occurred in the recent past, with harsh results for the harvesting and processing sectors.

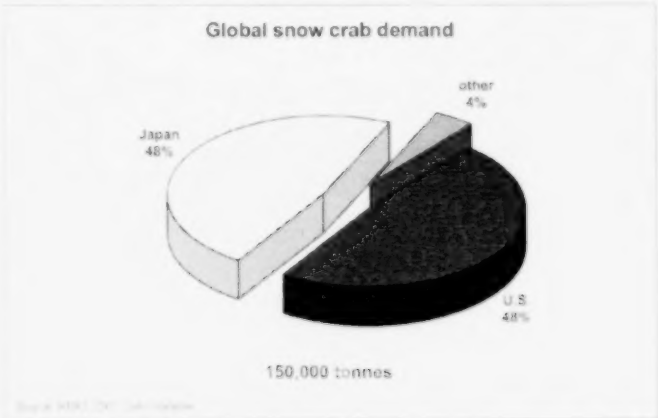
The current difficulties in the industry arise from buyers in the major markets seemingly misjudging the robustness of demand. The greatest potential source of instability in the industry today lies in the possible recovery of the Alaska snow crab stock.

2. Global demand and supply

Demand

Global markets consumed about 150,000 tonnes (live weight equivalent) of snow crab in 2005, with a wholesale value of about US$670 million (based on export prices). The U.S. and Japan share roughly equally 96% of the global market 2005 (Fig. 3.1).

Fig. 3.1: The global market for snow crab is estimated at US$670 million (export value). Two countries share about equally 96% of the market.



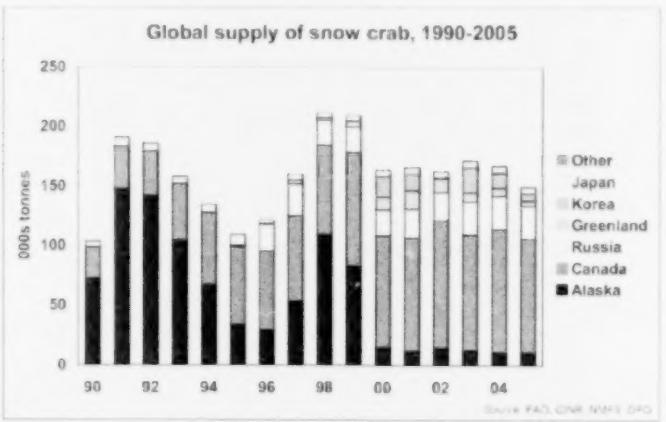
The U.S. market has grown steadily over the past decade, while the Japanese market, particularly for frozen product, has declined. Economic factors represent the main factor behind the demand trends. The U.S. has enjoyed fairly strong economic growth over the past several years, with seafood imports generally responding to the rise in prosperity.

Supply

Snow crab is found in the waters of the northwestern Atlantic and the north Pacific. Six countries fish these waters, producing just over 150,000 tonnes annually for the past several years (Fig. 3.2). Crab supply reached a peak in 1998, when just over 200,000 tonnes were landed. The drop in the Alaskan fishery accounts for most of the decline. The other regions are believed to be fishing at more or less maximum sustainable levels (with some uncertainty surrounding the Russian fishery). The exception is Greenland whose stocks are believed to be underexploited due to lack of capacity.

Looking ahead, the prospect of returning to the harvest levels of the late 1990s would appear to depend chiefly on the recovery of stocks in Alaskan waters. The fishery enjoyed a modest increase in TAC in 2006, following several years of stable quotas. This stock has experienced wide swings in abundance in the past, and this year's upturn could signal the leading edge of a recovery (see Fig. 3.3, below).

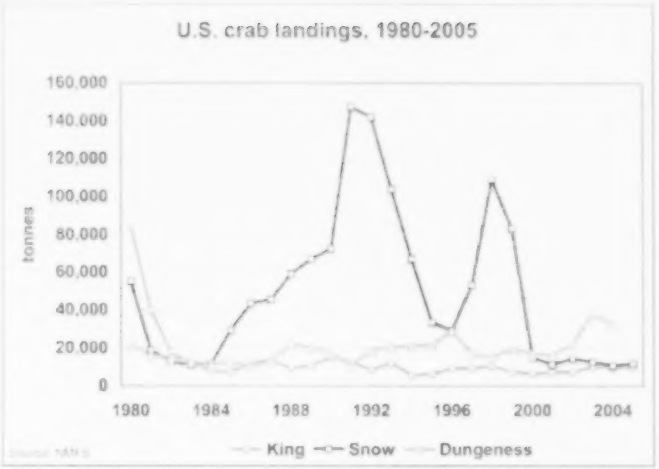
Fig. 3.2 Six countries produce the global supply of snow crab, estimated at 150-170,000 tonnes annually over the past five years. Canada is the leading producer, supplying over two-thirds. There are doubts about the accuracy of the Russian catch due to illegal fishing and misreporting.



The impact of the Alaska crab fisheries on the global crab market is not confined to the production of snow crab. Alaska has, or more correctly had, numerous crab stocks of various species supporting commercial fisheries. Many of these are small stocks with limited fisheries (500-1,000 t). Others, including two red and two blue king crab stocks, and two Bering Sea crab stocks – snow (*C. Opilio*) and Tanner (*C. Bairdi*), had been of considerable commercial significance at one time. Today, only two of these support a significant commercial fishery: the Bristol Bay red king crab and the Bering Sea snow crab. Stock collapses have resulted in cuts to TACs, with both fisheries producing well below peak levels (Fig. 3.3).

Elsewhere in the U.S. (mainly in the waters off Washington, Oregon and California), the Dungeness crab also represents a competitor for Canadian snow crab. Over the past decade, these fisheries have produced 15-20,000 tonnes annually, but in 2003 this jumped to 40,000 tonnes, holding at just below this level in 2004. This increased supply provided U.S. food service firms and retailers with a good substitute for the increasingly expensive snow crab.

Fig. 3.3: The Alaska king crab fishery collapsed in 1981-82 and has not recovered. Alaska snow crab stocks also collapsed in 1981-82, but then recovered and collapsed twice more by 2000. These shifts have allowed Canadian snow crab to occupy a major niche in the U.S. market. Dungeness crab is a snow crab substitute (commanding a lower price). Increased supply in 2003-2004 contributed to weak markets for snow crab.



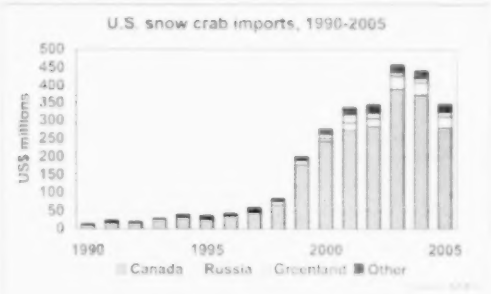
3. Markets

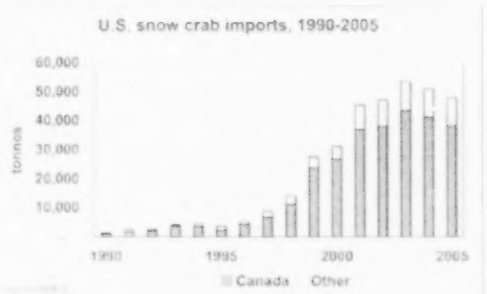
U.S.

The strong growth in snow crab imports into the U.S. partly reflects demand conditions, but also the collapse of the Alaskan crab fishery in 2000. This is evident from Fig. 3.4 showing U.S. imports rising from under US$100 million in 1999 to over US$450 million in 2003. Much of this growth is due to price increases (responding to demand and reduced supply from Alaska), but until 2003 there had also been growth in overall quantity including supplies from Alaska (Fig. 3.7). Canada is the major supplier to the U.S. (80% of total), followed by Russia and Greenland.

Total U.S. snow crab demand (imports plus domestic supply) is in the 45-50,000 tonne range (product weight).

Fig. 3.4 and Fig. 3.5: Value and quantity of snow crab imports by the U.S. increased sharply after the collapse of Alaskan stocks in 2000. The market peaked in 2004 and turned down in 2005 in response to prices too high for the market to bear. Overall demand declined by just 10%, while the value of imports dropped by almost US$100 million. The market appears to have recovered somewhat in 2006, with demand and prices edging upwards.

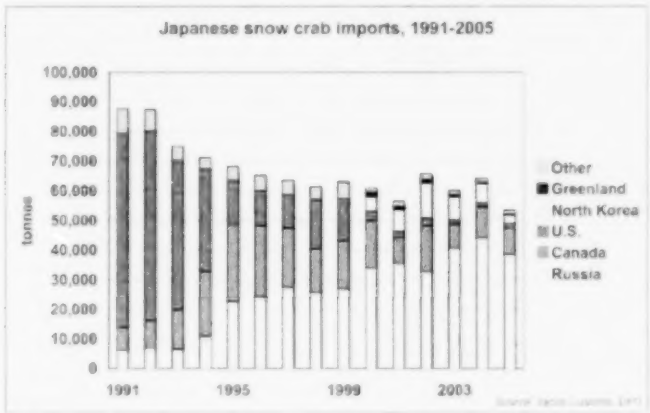




Japan

The Japanese economy has remained stagnant for much of the past decade, recovering (albeit haltingly) only in the past year or so. In the face of this, Japanese consumers have turned to lower value products, reducing their overall demand for crab (all species). In the past decade, demand for snow crab has gradually dropped by about 10% (Fig. 3.6) to the current level of just over 50,000 tonnes (product weight). In addition to snow crab, Japan also imports several other crab species against which snow crab competes for the consumer dollar.

Fig. 3.6: Demand for snow crab in Japan has declined steadily since the early 1990s due to a weak economic climate and changing consumer preferences. In the mid-1990s Canada supplied 50% of imports; this is now down to less than 20%. Price is a major factor for the shift. Japanese importers have been able to secure Russian crab at more favourable prices. How long this may continue is difficult to say, given concerns over illegal fishing of Russian stocks.



Products and consumption patterns

Snow crab occupies essentially a commodity niche in the U.S., finding its way to the mid to lower end of the food service and retail segments. The Japanese market targets the mid-to high end of the range.

U.S.

Crab sections or clusters are by far the dominant product form, accounting for over 95% of imports. In recent years, over 98% of Canadian exports (by weight) to the U.S. have been in frozen section form. Some meat extraction may occur in the U.S., but relative production costs would make this an unattractive business.

The food service segment consists of three main components: mid-price restaurants (e.g., Red Lobster), the lower price Asian and seafood buffets, and casinos. Each of these outlets is highly price-sensitive and will switch quickly to substitute products if relative prices dictate. Other crab species (e.g., Dungeness and Angulatus) were the main substitutes in 2004 and 2005 (possible because of high catches in the U.S.), though Jonah and rock crab were also used in some applications.

The retail segment tends to use crab as a promotional item, settling for a narrow sales margin (30-35%). Promotions are possible only if crab falls below a certain price (US$3.50/lb is cited as the maximum, allowing retailers to sell at or below the deemed price ceiling of US$4.99/lb). The prevailing view is that it is difficult to get retailers interested in crab when the wholesale price rises above US$3.50/lb (as it did in 2004, resulting in the sharp drop in demand and prices that carried over into 2005).

Japan

The Japanese market is more varied than the U.S. in terms of product form and utilization. Crab is supplied live, whole frozen, in gas and brine frozen sections, and as crabmeat for the sushi market. Canadian exports to Japan are predominantly in frozen section form, with meat extraction taking place in plants in China or another Southeast Asian country. Some of the same Japanese companies who import the Canadian crab own these plants.

The food service segment of the market consists of two main components: vacation and luxury restaurants (many of these are in Hokkaido in the north where there is a relatively small Japanese snow crab fishery) that would serve whole crab or crab sections, and sushi restaurants that would serve crab meat. This market segment represents a generally higher end market than food service in the U.S. Japanese importers, accordingly, are prepared to pay higher prices for the crab.

The retail segment consists primarily of department stores with demand strongest during seasonal gift occasions. There are reports that demand is beginning to extend beyond these seasons, with prices strengthening as a consequence.

Price development

Long term

In light of several factors on the demand and supply sides of the market, snow crab prices are susceptible to wide swings. Among the demand side factors are the limited markets in which it is sold, and the relatively narrow segments it occupies in these markets. On the supply side are the cyclical nature of supply in the few areas where snow crab is fished, and the ready availability of substitute species.

Over the long term (since 1990 shown in Fig. 3.7), the price received by Canadian exporters has fluctuated between a high of US$4.55/lb (1995) and a low of US$2.25/lb (1992 and 1998).* These highs and lows coincide with the lows and highs in the total supply of crab in the U.S. market, and in particular with supply from the Alaskan fishery.

Worth noting in Fig. 3.7 is that the price swings become dampened with greater stability in supply. After 1999, the lows are not as low as they used to be and the highs not as high. In part this is because there is less crab in total on the market (bringing up the floor price) in the face of relatively stable demand. The high point (1995) could be considered an anomaly resulting from the sharp drop in the Alaskan catch at a time when Canadian supply was substantially lower than its level in the past five years. Also, much of the Canadian supply was exported to Japan at the time due to the high value of the yen.

It is also worth noting that the export prices in the US$2.25/lb range occurred in a relatively low cost environment *and* at a more favourable exchange rate. It is doubtful whether vessels could cover their variable costs at the price they would receive in this market. Allowing for yield loss, commissions and production costs, processors could not afford to pay more than CAN$0.50-0.70/lb for raw material. Consequently, supply would drop, restoring prices to at

* Unless otherwise indicated, U.S. prices refer to the delivered price received by Canadian processors for exports of 5-8 oz crab sections to the U.S.

least break-even levels. Where that break-even level may be is not clear. Before fuel prices increased to current levels, vessels in some areas fished others' quota for $0.65-0.75/lb. The marginal cost of harvesting is likely to be in the $0.90-1.00/lb range at today's costs, depending on vessel, distance from shore and catch rates.

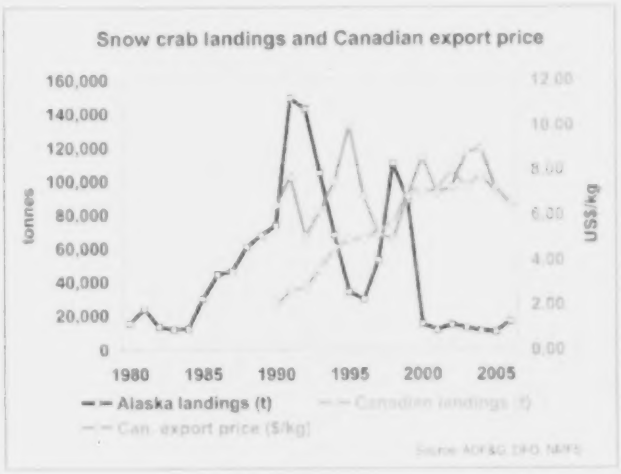


Fig. 3.7: Long-term snow crab export price shows typical sensitivity to swings in supply (with demand rising slowly) between 1990 and 2003. The drop in price in 2005 results from of factors on the demand side and occurs despite a small drop in supply. Crab simply became overpriced in the U.S. market and retailers and food service companies looked to substitutes to meet their needs. In mid-2006, the price had dropped to the US$2.75-2.95/lb range, though had begun to strengthen to the US$ 3.00/lb range by September.

Short term

Though long-term movement in prices shown in Fig. 3.7 came mainly in response to supply shifts. Demand for crab in the U.S. is more stable, but only within a certain price range. When prices exceed the level consumers are prepared to pay, demand drops. In late 2004-early 2005, demand for snow crab dropped sharply, resulting in the price weakness experienced during 2005 and into 2006. Availability of cheaper substitutes, including Dungeness crab, contributed to the price drop.

John Sackton, one of North America's leading experts on crab markets, offers the following explanation of the events leading up to the crash of 2005.

> **2003:** Japanese buyers entered the market late and were surprised by the level of U.S. demand and the prices being paid. They were determined not to repeat the mistake in 2004.
>
> **2004:** Japanese importers bought aggressively as a result of a perceived shortage in Japan. First contracts were set at CAN$4.40/lb FOB plant in Newfoundland.* U.S. importers and distributors also bought at these prices. U.S. retail and food service sectors reacted by cutting back on orders. Market characteristics in the U.S. are such that wholesale prices over US$4.00/lb, when passed along by retailers and restaurants, exceed what consumers are prepared to pay. Retailers refused to promote crab. Buffets substituted other crab species (Dungeness and Angulatus). At prevailing prices, sales in Japan were weaker than expected. The year ended with distributors and importers holding high inventories of unsold crab in both the U.S. and Japan. Adding to the difficulties were quality problems. A bonanza mentality swept the industry in Canada, resulting in poor quality product.

* The terms FOB and CIF refer to the seller's delivery responsibilities and corresponding cost for exported items. FOB stands for "free on board" and refers to the price of the item delivered to a carrier *excluding* insurance and freight costs. CIF stands for "cost, insurance, freight", referring to the price of the item including insurance and freight to destination.

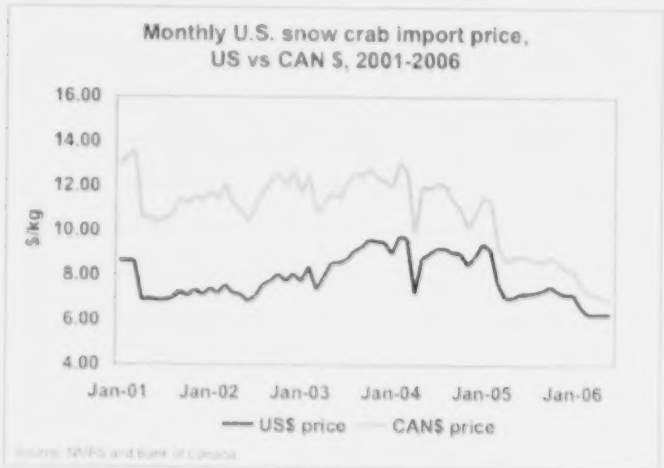
2005: U.S. buyers "revolt" and back away from the market. There is high inventory carryover keeping downward pressure on prices. Many processors are selling at below nominal cost. The risk of inventory losses coupled with the need for cash is causing processors to sell. U.S. distributors recognize the buyers' market, but are wary of entering it because waiting could result in even lower prices as processors become desperate. The strategy is not to buy until it appears the price has stopped falling. By the end of the year, import prices had fallen to their lowest level since 2000/2001 (below US$3.00/lb).

2006: Inventory has cleared out by the end of January after a sell-off. Import prices have dropped below 2005 levels (US$2.65-2.75/lb). Customers are beginning to see crab as a good value again and believe prices have hit bottom. Early season sales of Alaskan crab (the season opens in January) were priced aggressively (US$3.15/lb CIF East Coast). Given the typical price spread between Alaskan and Canadian crab (in the range of US$0.30-0.40/lb), this could mean the early season Canadian crab would sell for US$2.75-2.85/lb). Japanese are buying at US$2.70/lb FOB Newfoundland. The market was lackluster through May, June and July, with purchases of small lots in the US$2.85-2.90/lb FOB Boston range.

Exchange rates

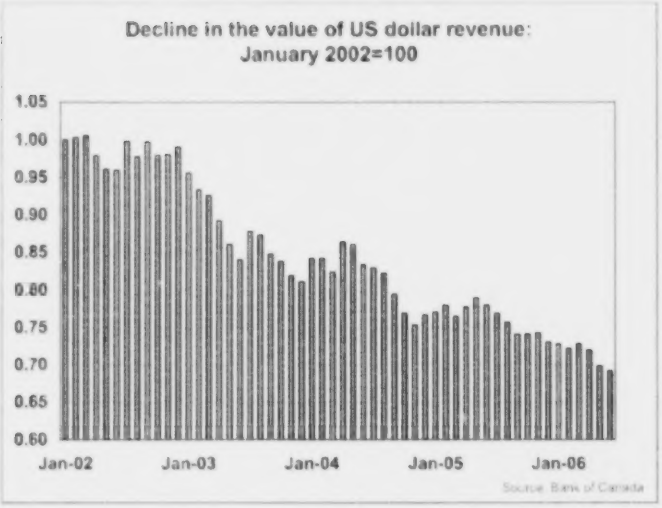
The Canadian fishing industry generally has been hard hit by the decline in the value of the U.S. dollar. This is evident from Fig. 3.8 that shows the narrowing gap between the U.S. and Canadian dollar prices of exports to the U.S.

Fig. 3.8: The adverse revenue impact of declining prices on Canadian processors (and harvesters) is compounded by the declining value of the U.S. dollar. Since early 2004, the Canadian dollar price of exports to the U.S. has declined by about 50%. Of this, 35% is due to the drop in crab prices, and 15% due to the exchange rate.



The impact is illustrated more clearly in Fig. 3.9. It shows that the Canadian dollar value of each U.S. dollar earned through exports to the U.S. has declined by over 30% since 2002. Since January 2004 alone, Canadian producers have incurred a 50% revenue loss due to the combined impact of declining prices and the adverse shift in the exchange rate. There is little in current conditions affecting the Canadian and U.S. economies that would suggest we are likely to return in the foreseeable future to the exchange rates of 2002. Parity is more likely.

Fig. 3.9: Each dollar of revenue earned through crab exports to the U.S. has declined by 30% since early 2002 as a result of the declining value of the U.S. dollar.



4. Issues and challenges

Key points

- Snow crab is essentially a commodity product supplied in about equal proportions to two markets, the U.S. and Japan. The market absorbs all that is produced, though prices are sensitive to supply.

- The fleets of six countries produce most of the global supply of snow crab (about 150,000 tonnes), with Canada accounting for about two-thirds. Global production has been stable for the past 5-6 years, at least according to official statistics. There is some doubt about the size of the Russian catch with high levels of illegal fishing reported.

- The Alaska fishery poses the greatest threat to market stability. Stock abundance and harvests have swung widely twice since 1990, sending prices skyrocketing or plummeting. Stock abundance and TAC increased for the first time in five years in 2006. This could be the leading edge of another spike in abundance.

- The market has an apparent wholesale price ceiling in the range of US$3.50/lb. The price may stray above this at times, but consumers back away at final selling prices based on wholesale prices above this level. This is what happened in 2004-2005 when wholesale prices moved above US$4.00/lb.

- The wholesale floor price is determined by the break-even cost of harvesting. Supply would not be forthcoming below this price. The break-even cost of harvesting is not known with confidence, but probably lies in the range of CAN$0.90-1.00/lb in the Canadian fishery, and may be as low as US$0.65-0.75/lb in Alaska (which now has fewer than 90 large vessels fishing 13,000 tonnes). At prices less than US$2.50/lb (about CAN$2.75/lb at current exchange rates) processors are unlikely to cover their costs (about CAN$1.50/lb) and pay harvesters enough to make it worthwhile to go fishing.

- Price swings tend to be supply driven. In this case, Alaska bears watching. If the upturn in 2006 does represent the leading edge of a spike in abundance, then the industry is in for some years of low prices. As long as total supply exceeds 150,000 tonnes it will be difficult to move product at wholesale prices exceeding about US$3.50/lb (this price reflects a stable market, not the conditions experienced in the past two years).

- The price of snow crab is not just about the supply and demand for snow crab. Substitute crab species are available when prices move beyond acceptable levels. When gauging the market, processors have to focus not just on the supply of snow crab, but also on what is happening in fisheries for substitute products.

- The 2005 price drop was largely demand driven, though facilitated by abundant supplies of substitutes. Distributors tried to pass on higher prices than retailers and the food service sector were prepared to pay resulting in crab disappearing from display cases and menus. Sales slowed leaving considerable quantities of crab in inventory in the U.S. Wholesale prices had to drop before sales could be made, resulting losses on inventory. Processors continue to feel the effects of this in 2006. The market is gradually returning to stable conditions, but a period of relatively low prices is needed to restore confidence and induce retailers/food service companies to buy crab again.

Observations

The crab industry at times defies reason (those in the processing sector would argue it *always* defies reason). The price swings resulting from changes in supply are easy to understand. This is elementary economics. The price drop in 2005 resulted from a response on the demand side and presents more of a challenge to comprehension.

It seems that everyone in the industry knows that when the wholesale price of snow crab rises above US$4.00/lb customers (retailers, restaurant chains and casinos) back away from the product because they cannot realize sufficient margin at the maximum prices they are able to charge consumers. Yet, in full knowledge of this, importers and distributors bid up the price to levels above the magic $4.00/lb level. Perhaps they expected things would be different this time and it was worth a try in what they may have perceived as strong market conditions. Perhaps they were not aware that abundant supplies of moderately priced substitutes were available (though they no doubt handle these products as well).

But throwing the industry into a tail-spin is not without its precedents by companies who should know better but seem powerless to resist when seized by market frenzy. A similar situation developed in Newfoundland in 2003 when companies, competing for raw material in a buoyant market, acting without coercion and in full knowledge of market conditions, bid up the shore price to unprofitable levels and then shut down the industry until harvesters were prepared to accept lower prices.

The lesson seems to be that from time to time reason takes a back seat to the appetite for risk, with participants blind (or indifferent) to the mistakes of the past. If that is truly the case, then bouts of instability can be expected to occur with some regularity.

Looking ahead, the major concern on the horizon for Canadian industry is likely to be the prospect of a recovery of the Alaska fishery. The market as it is currently constituted (narrow and price-sensitive) is unlikely to be able to absorb increased supply without a fall in prices from historical norms (say, in the US$3.00-3.50 range). A long-term price at the lower end of this range would mean some adjustment for the industry.

IV

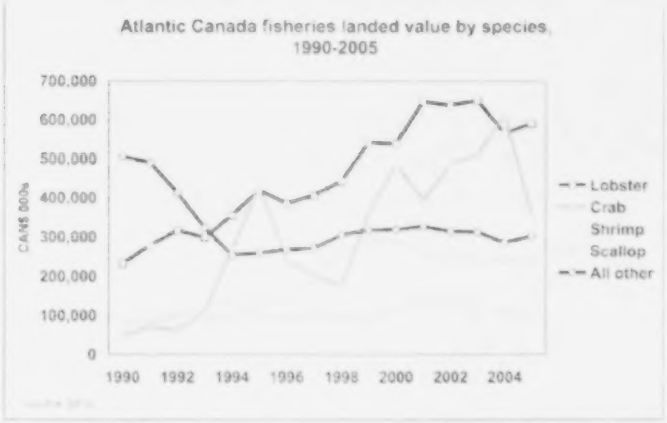
HARVESTING SECTOR

1. Overview

The fisheries of Atlantic Canada have changed dramatically over the past 25 years. The extension of jurisdiction in 1977 resulted in a massive expansion in fleet capacity, with much of the focus on the groundfish fisheries. Landings increased rapidly and more effort was drawn into the fishery. The introduction of limited entry licencing in the late 1970s slowed capacity growth somewhat, but competitive fishing provided a strong incentive to continue to invest in larger vessels and greater processing capacity.

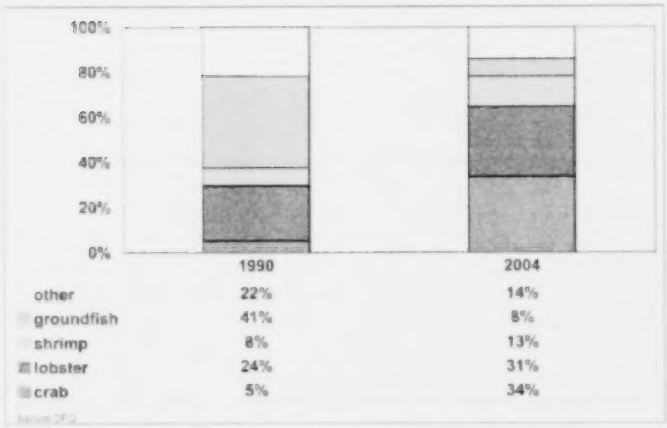
Though the industry endured financial and market crises along the way, it was not until the early 1990s that the groundfish resource itself collapsed throwing thousands out of work around the region. But almost as swiftly as the groundfish economy was disintegrating, a fishing economy based on shellfish was emerging to replace it. To some extent this had started with lobster in the early-1980s, but the transition did not take off until the 1990s. Whereas in 1990, all species of shellfish accounted for about 50% of landed value in Atlantic Canada, by 2004 this had increased to just over 87%.

Figure 4.1: The Atlantic fisheries were marked by a collapse of major groundfish stocks in the 1990s. With the rapid growth in shellfish stocks, the fishing economy has become increasingly dependent on four species: lobster, snow crab, northern shrimp and scallop.



Snow crab leads all species in the rate at which landed value increased between 1990 and 2004 (a 12-fold increase, albeit with some wide fluctuations). In 2004 it accounted for 34% of total landed value. This increase was due to a combination of factors including increased biomass and quotas, rising prices particularly after 1998 and the sharp decline in catches in Alaska, and until 2002, favourable exchange rates in the dominant markets, Japan and the U.S. The sharp drop in crab landed value in 2005 (Fig. 4.1) occurred because three key factors – biomass, price and exchange rate – turned against the industry.

Figure 4.2: Three shellfish species – crab, lobster and shrimp – accounted for 78% of total landed value in 2004, up from just 37% in 1990. Even in 2005 with the drop in crab prices, these three species accounted for 75% of total landed value.

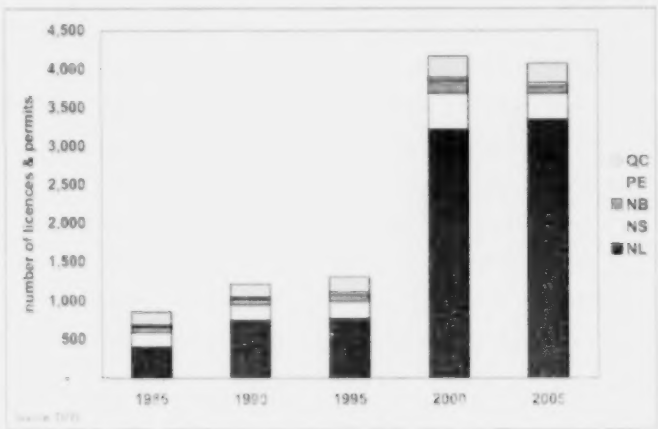


While the crab expansion during the 1990s contributed greatly to strengthening coastal communities devastated by the groundfish collapse, it also led to considerable strain in these same communities. This is because the wealth resulting from the expansion was not shared equitably. It was highly concentrated in the few hands fortunate enough to hold the crab licences.

By the mid-1990s, DFO was coming under increasing pressure to ease limitations on entry to the crab fishery. The inequities were plain to see. This presented DFO with a difficult problem. Those holding the licences did not wish to see their position eroded in circumstances that could change overnight (as they had with lobster in the 1970s and more recently with groundfish). By the same token, DFO did not wish to expand harvesting capacity, and in the face of possible declining stocks in the future, have to bail out yet another fishery. DFO was also sensitive to the risk of pressure to expand quotas as more capacity entered the fishery, resulting in the inevitable charges that it was mismanaging the resource.

DFO responded to the demands to share the resource in two ways: by introducing temporary permits and through elaborate rules-based sharing arrangements. These were introduced in the mid-1990s and reduced some of the pressure on DFO. But once on the slippery slope of opening access, finding a secure stopping point proved difficult. Temporary permits were made permanent in several areas and pressure continues to provide more equitable access.

Fig. 4.3: Snow crab licences doubled between 1985 and 1995. The number of licences/permits increased two and one-half fold between 1995 and 2000 following the introduction of temporary permits. Most of the increase occurred in Newfoundland and Labrador in response to increasing crab stocks and against the backdrop of the collapse of the northern cod stocks. By 2005, permits had been converted to licences, and they were allocated about 23% of the TAC.



Rising quotas and a larger harvesting sector gave rise also to an increase in processing capacity, particularly in Newfoundland and Labrador and northeastern Nova Scotia. In the early 1990s, 17 plants operated in Newfoundland and Labrador; 36 processed crab in 2005. In northeastern Nova Scotia 10-12 plants operate, half of which started up in the past 5-6 years. Plant numbers in the Gulf of St. Lawrence have declined mainly because of consolidations in New Brunswick (down from 22 to 12), while the number of plants in Québec has remained fairly stable (at 22-25) over the past several years. All these plants provide much-needed employment and income in the coastal communities where alternative opportunities are limited or non-existent.

2. Licencing – trends in access to the fishery

Newfoundland and Labrador

The crab fishery began in 1968, tracing its origins to reports of large crab by-catches in the cod gillnet fishery in Trinity Bay. Facing wide stock and market fluctuations over the next decade, a fleet of 50 or so full-time licence-holders eventually became established (another 75 or so were issued licences but let their licences lapse because of poor economics), producing 10-14,000 tonnes annually between 1979 and 1983. Further increases in stock abundance and distribution saw the full-time fleet grow to 71 licences by 1987 (Table 4.1). Today, the full-time fleet is comprised mainly of vessels in the 55-65' range and fishes in offshore waters (beyond 50 miles) primarily in NAFO Divisions 3K and 3L, with limited access to 2J.

Table 4.1: Snow crab licences & permits in Newfoundland & Labrador

	1985	1990	1995	2000	2005p
2HJ					
Communal				1	1
2J					
Full-time		4	4	4	4
Supplementary	25	30	30	30	31
Inshore			n.a.	67	67
Communal				5	6
3K					
Full-time	29	29	29	29	29
Supplementary	210	225	237	237	240
Inshore			n.a.	553	636
3L					
Full-time	38	38	38	38	38
Supplementary		318	325	328	325
Inshore			n.a.	822	819
Exploratory				3	3
Offshore				1	1
3Ps					
Supplementary	100	100	100	100	100
Inshore			n.a.	684	716
Offshore				1	1
4R3Pn					
Inshore			0	308	322
Total	402	744	763	3213	3339

Source: DFO Newfoundland Region

Participation in the fishery expanded in the late 1980s with access opened to longliners facing declining incomes in the groundfish fishery. This had been made possible by holding the quota for full-time licences steady as the TAC increased. By 1988, some 650 of these so-called "supplementary" licences had been added to the fishery, initially in 2J, 3K and 3Ps, and then in 3LNO. In order to spread out fishing effort within the 3L area, the supplementary fleet was divided into large and small components in 1994, with the small vessel fleet (<40 GRT) fishing a zone closer to shore and the large vessel fleet (≥40GRT) fishing an outer zone. The supplementary fleet reached its current level of 696 licences in 2001.

Participation in the fishery greatly expanded in the 1995, when 400 temporary seasonal permits were issued by random draw to eligible harvesters in the inshore fleet (<35'). These licence-holders were granted access to replace income lost due to the groundfish moratorium. By 1998, all those defined as core enterprises gained access to the crab fishery through temporary permits.

By 2000, the inshore fleet had expanded to 2,434 licences, and with some modifications to access criteria, participation reached 2,560 licences by 2005. Each of these enterprises fishes subject to an individual quota.

A communal licence was issued in 1997-98 to the Labrador Inuit Associations. Eight harvesters are designated to fish under this licence. Several exploratory and experimental licences have also been issued over the years, and most of these have been converted to permits.

Nova Scotia

The snow crab fishery began off the northwest coast of Cape Breton Island in the mid-1960s in the area now known as CFA 19. With strengthening markets, the fishery expanded all along the west coast in the early 1970s into what became CFA 18. The fishery expanded over the years, with the Area 19 fleet growing from six licences in the early years to about 60 in 1984. By 1992, the fleet had grown to 74 participants. As landings and prices increased the fleet expanded again, adding 37 participants under temporary permits. These eventually became permanent bringing the fleet to 111 commercial licences, with 74 fishing 18 traps and 37 fishing four traps (Table 4.2). Six of these commercial licences are held by First Nations.

During the mid-1970s vessels also explored grounds along the east coast of the Island, finding commercial quantities of crab in various areas. DFO managed crab as a supplemental fishery in the late 1970s because in those early days ex-vessel prices and landings varied widely, with the fishery characterized by intermittent and limited effort. By 1980, the fishery was managed as a commercial fishery. Some 125 licences had been issued and CFA 20 to 24 had been defined.

Table 4.2: Snow crab licences & permits in Nova Scotia

	1985	1990	1995	2000	2005
CFA 12					
Traditional	2	2	2	2	2
Non-traditional	-	-	3	-	3
CFA 18/19 (NS)*					
Traditional (CFA 18)	23	27	30	30	30
Traditional (CFA 19)	61	74	74	111	111
Temporary (CFA 19)	-	-	-	73	73
Zone F			5	5	7
CFA 20-22					
Licence holders	74	74	74	74	74
Quota Holders	-	-	-	6	1
CFA 23*					
Licence holders	22	22	22	24	39
Quota Holders	-	-	-	54	22
CFA 24*					
Licence holders	17	17	21	23	38
Quota Holders	-	1	-	69	16
Total	199	220	231	471	419

* First Nations are included as regular commercial licence holders

Source: DFO Scotia-Fundy Region

Conditions in the fishery improved in the early 1990s. The stock recovery coincided with the emergence of a much stronger market for snow crab. Fleet profitability greatly improved just as the groundfish sector in the area faced depressed landings and eventually a moratorium. This combination of improved earnings in the crab fishery coupled with the groundfish collapse led to considerable pressure for further entry and access into the crab fishery.

DFO responded initially (1998) by providing access in non-traditional areas to fishermen who had been dependent on the groundfish fishery. In 1999, core adjacent fishermen were granted access, as were First Nations through the Aboriginal Fisheries Strategy. Core fishermen non-adjacent to the resource were added in 2000, and in 2002 several new licences for First Nations were created through the buy-back of temporary quota to meet obligations arising from the Marshall decision. By 2002, approximately 145 licenses (including First Nations communal licences) and nearly 700 temporary permits had been issued.

The "Temps" did not actually fish their allocations. They were required to consolidate their individual quotas to minimum levels in order to limit the number of vessels actually fishing (in practice this meant consolidating 5-7 permits in order to be issued the equivalent of a licence). As a result, no more than 250 vessels were active in 2000. Table 4.2 (under "Quota Holders") shows the number of licence-equivalents in CFA 20-24, not the actual number of permits issued.

Those participating under temporary permits operated subject to a complicated sharing arrangement featuring a sliding scale of access thresholds. This led to major challenges each year in establishing fishing plans and resulted in annual disputes about allocations and access. In 2005, DFO introduced new access and allocation arrangements that saw all temporary access become permanent. All participants are issued licences, though the former temps (now known as Quota Holders) are required to achieve substantially higher levels of consolidation in order to be issued a licence (see Table 4.2).

New Brunswick

The New Brunswick snow crab fishery began in the mid-1960s following the reports of landings off Gaspé and western Cape Breton in the early 1960s. New Brunswick boats were among the 60 vessels in the southern Gulf of St. Lawrence participating in the fishery in 1968. The fishery developed rapidly as new concentrations of crab were discovered. The fishery produced an average of about 5,000 tonnes annually during the 1970s, and then climbed steadily reaching a peak of about 31,600 tonnes in 1982. By this point, the New Brunswick mid-shore fleet had reached 80 vessels (Table 4.3).

Table 4.3: Snow crab licences & permits in New Brunswick

	1985	1990	1995	2000	2005
CFA 12					
Traditional	80	82	81	80	76
Non-traditional*	-	-	8	-	8
First Nations	-	-	-	7	7
Zone E			6	6	6
Total	80	82	95	93	97

*10% to seven groundfish harvesters and 90% to MFU

Source: DFO Gulf Region

The fleet endured a decade of relative hardship as stocks declined and landings dropped, reaching about 7,000 tonnes in 1990. The fleet did not expand beyond its traditional level of about 80 vessels until conditions began to improve in the early-1990s. Rising stocks and prices resulted in increased landed value through these years. Initially the industry and DFO responded to pressure to expand access by creating a special fund to share the wealth. Payments into the fund by the traditional fleet were based on certain financial thresholds being reached.

This approach proved unsatisfactory. A new approach was adopted in 1995 that allowed non-traditional harvesters (mainly those displaced by the groundfish moratorium) and aboriginal groups direct access under temporary arrangements. The sharing arrangement was based on a formula linked to the traditional fleet achieving certain financial thresholds. This approach resulted in temporary access for three years, 1995 to 1997. The fleet failed to achieve these thresholds after 1997 as the resource declined. It was not until 2001 that temporary access resumed for non-traditional harvesters. This was the last year for formula-driven access as non-traditionals gained permanent access in 2002. The eight licences are assigned to seven individuals and one to the Maritime Fishermen's Union (with the allocation shared among 40-45 member vessels). In the meantime, First Nations gained permanent access in 2000 following the 1999 Marshall decision (Table 4.3).

Prince Edward Island

The PEI fleet began fishing in 1985 when 16 exploratory permits were issued to inshore vessels. By 1992, the fleet had expanded to 30 vessels (Table 4.4). This traditional fleet of <35' vessels fishes in waters close to shore. A separate zone (CFA 25-26) off the north coast of the Island had originally been designated for this fleet. In 1997, CFAs 25-26 were incorporated into CFA 12.

Table 4.4: Snow crab licences & permits in PEI

	1985	1990	1995	2000	2005
Traditional	16	30	30	30	28
Non-traditional	-	-	2	-	2
First Nations	-	-	-	2	2
Zone E	-	-	1	1	1
	16	30	33	33	33

Source: DFO Gulf Region

Québec

The snow crab fishery in Québec began in the 1960s off Gaspé (in what is now CFA 12) and gradually expanded to the North Shore and St. Lawrence estuary (CFA 13-17) as wider distribution of the stock was discovered. CFA 12A, 12B and 12C, originally exploratory areas, were added to the fishery in 2001.

The number of licences remained fairly stable once the fishery in each area reached what appeared to be the limits of exploitable biomass. The CFA 12 mid-shore fleet reached 47 vessels by the mid-1980s and changed little until formula-based temporary sharing was introduced in the mid-1990s. This resulted in sharing in some years (1995-1997) and not in others (1998-2000). The number of temporary permits gradually increased from 32 in 2001 to 83 in 2005 (Table 4.5).

Table 4.5: Snow crab licences & permits in Québec

	1985	1990	1995	2000	2005
CFA 12					
Regular	47	47	47	47	44
Temporary	-	-	n.a.	-	83
First Nations	-	-	-	-	3
CFA 12 A,B,C,E					
Regular	n.a.	n.a.	23	23	21
Temporary	-	-	-	-	11
First Nations	-	-	-	-	3
Zone F					
Regular	n.a.	n.a.	11	11	11
Temporary	-	-	-	-	2
CFA 13-17					
Regular*	n.a.	n.a.	130	130	121
Temporary	-	-	n.a.	65	128
First Nations	-	-	n.a.	-	7
Total	176	176	211	276	434

*Includes 42 licences in CFA 13 inactive since 2003 due to moratorium

Source: DFO Quebec Region

The traditional fleets in CFA 13-17 expanded with landings through the 1980s, reaching current levels as stocks reached peak levels in the mid-1980s. Landings dropped sharply during the late 1980s, providing no basis for continued fleet expansion. Recovery in the early 1990s provided some impetus for resource sharing, and temporary access for 20 or so permit holders was provided in the mid-1990s. This lasted until 1997, when stocks declined below threshold levels. Temporary access resumed in 1999 (CFA 15 and 17 only), and with some fluctuation, increased to 128 permits in 2005 (Table 4.5).

First Nations acquired communal licences in CFA 12 and 13-17 in 2002 through buy-outs of regular commercial licences. Temporary access in other areas (CFA 12C and Zone F) began in 2002 with a total of 13 permits issued in 2005.

3. The snow crab fishery – landings and seasons

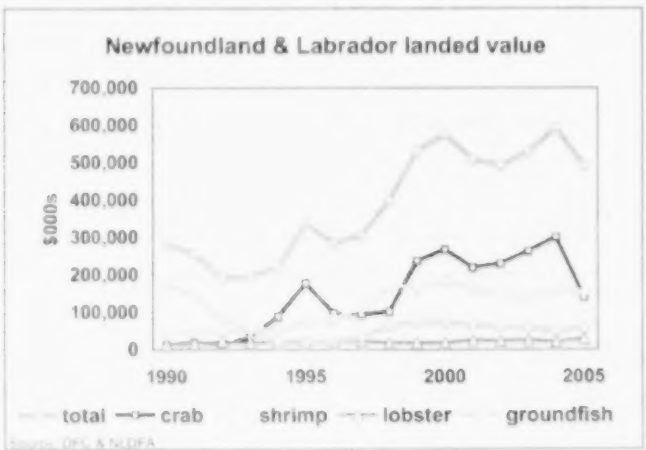
Newfoundland and Labrador

Of all the provinces, Newfoundland and Labrador has experienced the sharpest transition from a coastal economy dominated by groundfish to one dominated by shellfish. As recently as 1990, groundfish accounted for over 60% of the total value of landings ($283 million). The collapse of the northern cod stock and the sharp decline of other groundfish stocks resulted not just in the loss of thousands of harvesting and processing jobs, but of a way of life in many communities. In the space of just a few years, the value of groundfish landings had dropped to below $20 million (Fig. 4.4).

Prior to the late 1980s, shellfish species were of relatively minor importance to the Newfoundland and Labrador fisheries. This changed abruptly after 1993. The abundance of crab and shrimp increased sharply, providing opportunities for many of those displaced by the groundfish moratorium. Crab quotas and landings doubled between 1990 and 1993, and then doubled again by 1997. Landings peaked at 69,000 tonnes in 1999, and then settled at the 55-59,000 tonne range over the next five years as stocks declined. Landings dropped to 44,000 tonnes in 2005, some 5,000 tonnes below the TAC.

The total value of landings peaked at just under $600 million in 2004, with crab accounting for just over 50% (Fig. 4.4). Crab landings plummeted in 2005, dropping to just $140 million. Three factors explain the drop: reduced landings (down 20% from 2004), weak markets (shore prices down 30%), and the depreciation of the U.S. dollar (down by 10% against the Canadian dollar). An even more difficult year is expected in 2006, with weak markets pushing down landed value to below $100 million, a drop of two-thirds in just two years.

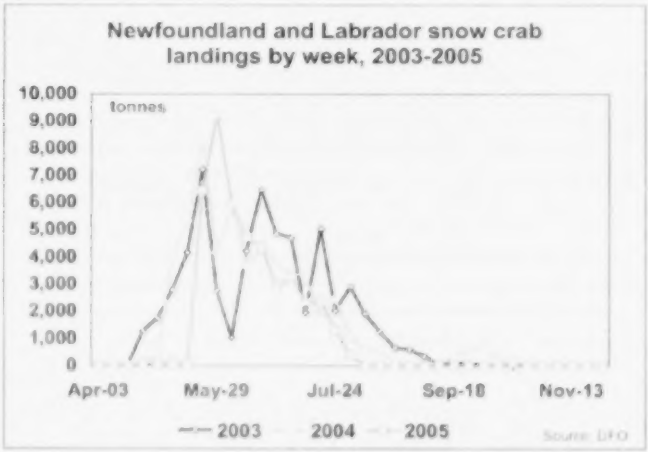
Fig. 4.4: Shellfish have replaced groundfish in the fishing economy of Newfoundland and Labrador. Crab leads all species, accounting for 50% of landed value in 2004. Lower landings, weak markets and the weak U.S. dollar caused landed value to drop from $300 million in 2004 to $140 million in 2005. Preliminary results for 2006 indicate landed value will drop to below $100 million.



The snow crab fishery typically lasts 8-10 weeks, opening in late April or early May and effectively closing by late June or early July. The season officially closed mid- to end-August up to 2004, but in 2005 it was closed in mid- to end-July due to the pervasiveness of soft shell crab. With high catch rates early in the season, landings peak sharply within the first 2-3 weeks and then decline gradually over the balance of the season (Fig. 4-5). The peak would likely be even sharper were it not for trip limits imposed on the full-time and supplementary fleets.

The Newfoundland and Labrador snow crab fishery has enjoyed few trouble-free years over the past decade. Events of the past three years, as reflected in the seasonal pattern of landings, are typical of the difficulties. In 2003, intense competition among processors for raw material resulted in a shore price for crab that proved unsustainable from a financial perspective. Processors stopped buying crab until vessels accepted a more reasonable price. In 2004, the fishery was delayed by about six weeks due to an impasse over opening prices. In 2005, vessels refused to fish until they were satisfied that a government-imposed mechanism to reduce destructive competition (Raw Material Sharing) would be reviewed with the prospect of termination at the end of one year. (It was terminated following a review completed in early 2006).

Fig. 4.5: The snow crab fishery is marked by a short season. Harvesters – despite individual quotas – are pressured by the need for income, to take advantage of early season high catch rates, and to avoid soft shell problems. The rate of landings would in all likelihood be higher were it not for trip limits on the full-time and supplementary fleets.



Harvesters hold allocations in the form of individual quotas (percentage shares of the quota in their area). This provides skippers with the assurance that their entitlement is there to be caught when they choose to fish it. In theory this provides harvesters with the basis for a balanced approach to the fishery, resulting in a smooth flow of raw material to processing plants thereby eliminating the gluts that are all too common in competitive fisheries.

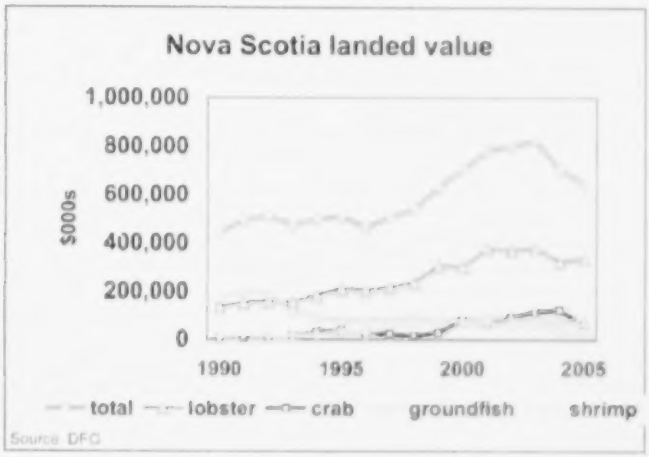
But implicit in the theory is an assumption that other pressures to harvest rapidly are absent. In fact there are several: the need for income, to fish when catch rates are highest, to avoid the risk of closure due to soft-shell crab, and to ensure the highest quality catch (including the possibility of high-grading).

Nova Scotia

Snow crab occupied a relatively minor role in the province's fisheries through the 1980s and 1990s, with effort and landings concentrated in northern Cape Breton where crab was of considerable economic importance. This changed in 2000 when the quantity and value of landings on the coast of northeastern Nova Scotia increased substantially following an increase in stock abundance. Landings, which had been ranging between 4-5,000 tonnes annually through the 1990s, increased three-fold in 2000, reaching 14,000 tonnes. Landings increased to 18,000 tonnes by 2004, then declined to 14,400 tonnes in 2005 following a drop in the TACs in all areas.

The rise in the economic significance of crab over since 2000 is evident from Fig. 4.6. From a $7 million fishery in 1990, landed value gradually increased to just under $120 million in 2004. This amounted to about 17% of total landed value in the province (up from about 2% in 1990). Landed value of crab dropped by almost half in 2005, due to the combined effects of reduced TACs, weak markets and continued depreciation of the U.S. dollar.

Fig. 4.6: Crab landed value increased to $120 million in 2004, up from $7 million in 1990. Before the sharp drop in 2005, crab accounted for 17% of total landed value. Its economic value, while understated at a provincial level due to the strong performance of lobster, is particularly strong in Cape Breton where the fishery and crab processing are concentrated.

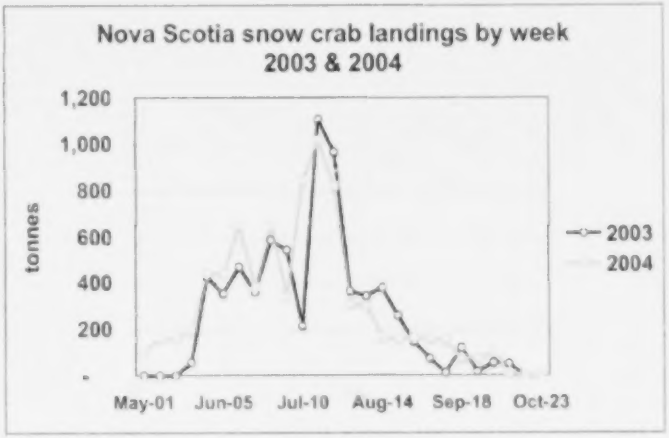


The Nova Scotia snow crab fishery operates in several areas each with its own season. Many harvesters hold lobster licences so the crab fisheries tend not to begin until lobster season has ended or at least begun to wind down.

- CFA 18 – harvesters based in CFA 18 fish the season consistent with CFA 12 of which CFA 18 forms a part (since 2003). It runs from late April-early May to the end of June.
- CFA 19 – mid-July to early September.
- CFA 20-22 – mid-July to late August.
- CFA 23 – June 1 to end October
- CFA 24 – July 1 in inner areas (avoid lobster conflict) and July 1 in outer areas, to November.

Taken together, the staggered seasons give the impression of a more stable flow of raw material to the processing plants. But the fisheries on the east and west coasts of Cape Breton tend to supply a different mix of plants resulting in a set of short seasons (8-10 weeks) for harvesters and plants rather than a single long season as the landings data in Fig. 4.7 suggest. As in other areas and for the same reasons, harvesters push to catch their quotas as quickly as possible.

Fig. 4.7: The seasonal pattern of landings reflects essentially three different start dates in four fishing areas. The fisheries produce from 7-10 weeks of relatively high landings.

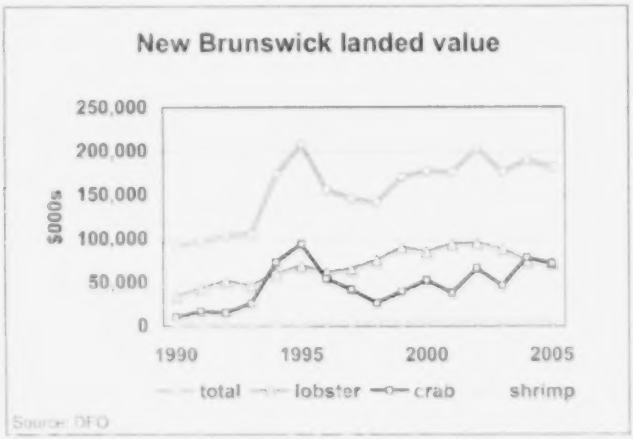


New Brunswick

The history of the southern Gulf crab fishery is one of cyclical shifts in abundance. Since the mid-1970s there have been three such 10-year cycles of growth, decline and recovery. Fig. 4.8 shows the most recent cycle, with recovery and growth in the mid-1990s following a downturn in the late 1980s. The fishery experienced its next growth period in the early 2000s, and is now heading into a period of weak recruitment and declining abundance.

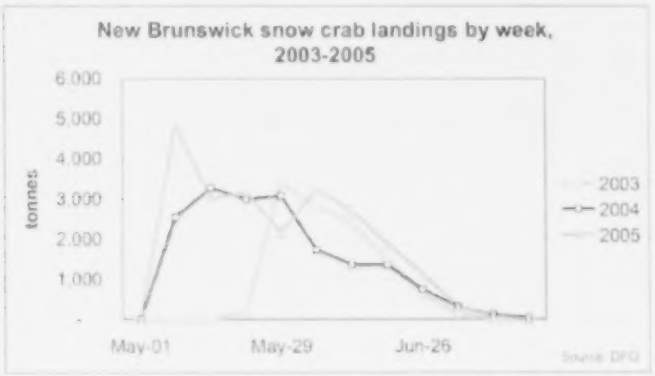
Landed value reached a peak of just under $100 million in 1995, when high abundance occurred during a period of strong markets. The recovery during the early 2000s was marked by some fluctuations in TAC, but against the backdrop of a generally rising trend. The years 2003-05 saw steady growth, with CFA 12 landings almost doubling from just under 17,000 t to about 32,400 t. Landed value increased from about $50 million in 2003 to $80 million in 2004. Despite further growth in landings in 2005, landed value dropped to the $70 million range due to the fall in prices.

Fig. 4.8: Landed value fluctuates with the cyclical abundance of snow crab. It peaked at just under $100 million in 1995 as crab prices hit a record high. Following a decline in the late 1990s, increased abundance and strong markets resulted a rising trend, with landed value reaching about $80 million in 2004. Weak markets caused this to drop to just over $70 million in 2005.



The season usually starts at the end of April or first of May, with landings rising sharply in the first week, stabilizing for 2-3 weeks and then declining gradually as quotas are filled and catch rates drop off. The late start in 2003 was caused by a dispute over allocations to First Nations and new entrants. The fishery is effectively over within 6-7 weeks as harvesters rush to catch their quotas to avoid soft-shell closures and to minimize costs.

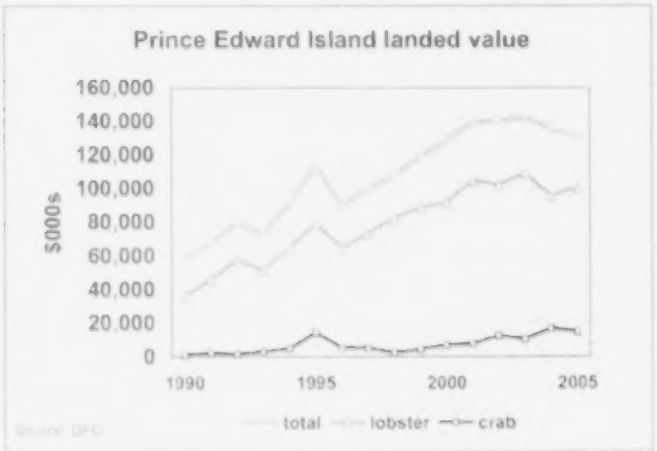
Fig. 4.9: The Area 12 fishery is highly seasonal, lasting in the range of 6-7 weeks. With high catch rates, quotas a filled in 15-16 trips of two days on average. The risk of soft-shell crab and high operating costs provide an incentive to take the quota as early in the season as possible and to limit the number of trips.



Prince Edward Island

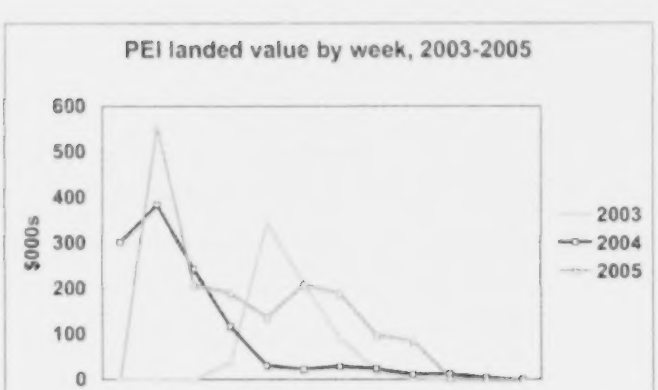
The PEI crab fishery has experienced rising landings and value over most of the past decade. Landed value peaked at just under $20 million in 2004, increasing from less than $5 million in 1998 when quotas and markets were at a low point. The fishery occupies a significant, though relatively small, part of the overall fishing economy valued at about $140 million in recent years (Fig. 4.10). The lobster fishery with its hundreds of licence-holders dominates the fishing economy of the Island.

Fig. 4.10: Crab made an increasingly valuable contribution to the PEI economy over the past decade, with landed value rising to the $20 million range in 2004. Landings are sold mainly to New Brunswick plants for processing.



The fleet of 30 or so vessels operates a relatively short season, often lasting just 4-5 weeks (Fig. 4.11). Landings peak in the first week and drop fairly sharply after that in response to the incentives to take their quotas as quickly as possible: to avoid soft-shell closures and to reduce operating costs by limiting the number of trips. The delayed start in 2003 was due to the dispute over allocations to First nations and new entrants.

Fig. 4.11: The PEI crab fishery lasts 4-5 weeks. The quantity landed is too low and the season too short to sustain a processing industry. To be viable, plants would need to augment local supply with raw material imported from adjacent provinces.

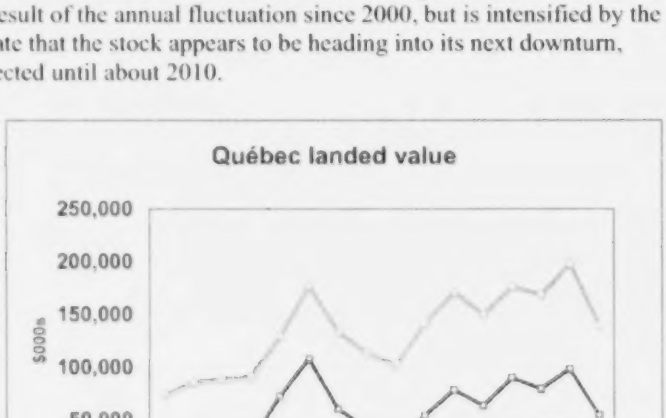


Québec

Crab has been the leading species in Québec for over a decade. Landed value exceeded $100 million in 1995, dropping to about $30 million in 1998 when prices plummeted in response to the sharp increase in the Alaska snow crab fishery. The fishery recovered over the next six years, again reaching about $100 million in landings in 2004. Lower landings coupled with reduced prices caused this to drop by half to the $50 million range in 2005.

The Area 12 fishery dominates the pattern of landings, with the cyclical downturn in the 1980s followed by growth in the mid-1990s, another downturn, and then a rising trend to the mid-2000s. The drop in 2005 is partly the result of the annual fluctuation since 2000, but is intensified by the drop in prices. Scientists indicate that the stock appears to be heading into its next downturn, with declining recruitment expected until about 2010.

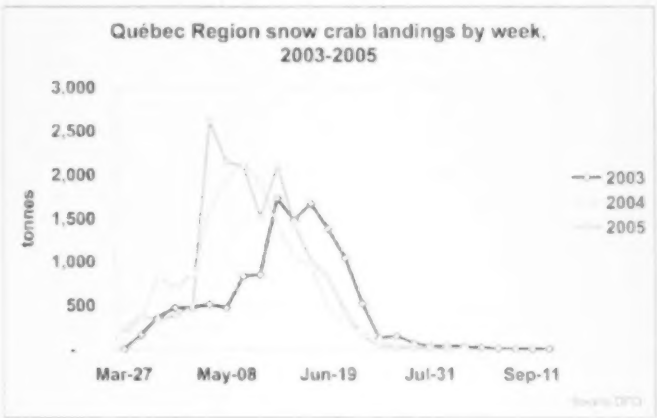
Fig. 4.12: Crab is the leading species in the Québec fishery. Landed value peaked in 2004 at about $100 million, then dropped by almost half to the $50 million range in 2005 as landings and prices fell.



The main Québec crab fishery in CFA 12 usually starts at the end of April or first of May. The smaller fisheries along the North Shore start when ice and weather conditions permit, generally early to mid-April. This pattern of staggered starts is reflected in landings, with the smaller fisheries generating a few hundred tonnes throughout April. Landings jump sharply at the beginning of May, with a 2-3 week peak, and then gradually decline as quotas are met and catch rates fall. Though the season may last for 10-12 weeks overall (Fig. 4.13), the period when the fishery produces sufficient quantity to keep all plants active is generally only 6-8 weeks.

Each of the seasons shown in Fig. 4.13 follows the typical pattern, though 2003 started late in CFA 12 in response to the dispute over allocations to First Nations and new entrants.

Fig. 4.13: The main part of the crab season typically last no more than 6-8 weeks. The delayed start in 2003 was due to a dispute over allocations.

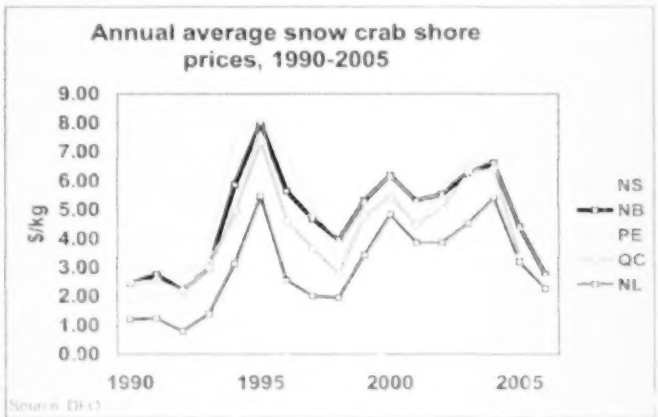


4. Fleet economics

Key Factors

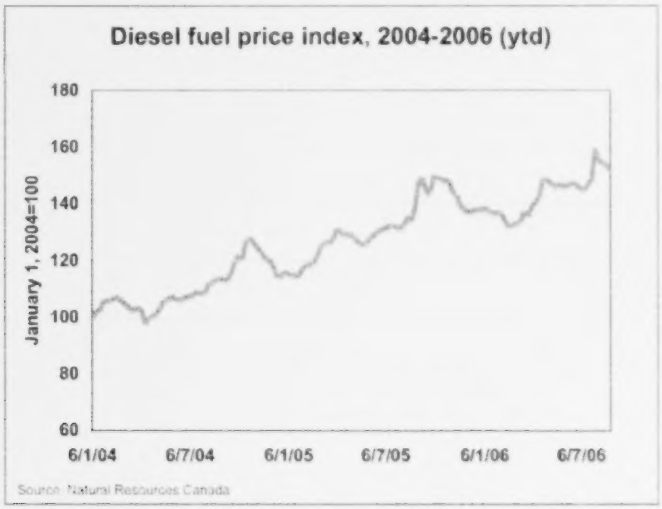
Fleet economics have deteriorated in 2004 and 2005 throughout the crab fishery. Three factors account for this: reduced landings, lower prices and rising costs. The change in landings has not affected all fleets uniformly, indeed in some cases landings have gone up. But in all cases gross revenues have declined due to lower prices (Fig. 4.14). By how much margins have been affected is not clear because reliable cost and earnings data are not available.

Fig. 4.14: Prices by province following the same trends. There has been a generally upward trend since 1992, with fluctuations due to major supply shifts. The price drop in 2005-06 is demand driven. Customers backed away from the market as prices crept above US$4.00/lb in late 2004.



Next to the crew, fuel is the major component driving operating costs. For most vessels it would account for up to 20% of variable costs. Since 2004, the price of diesel fuel has increased by 60%, with some of the sharpest increases occurring in the past year (Fig. 4.15).

Fig. 4.15: The price of diesel fuel has increased by 60% since the start of 2004.



Newfoundland and Labrador

The fleets benefited from rising quotas and good markets over much of the past decade. Weak markets in 2001 and 2002 mark the only departures from an otherwise solid period of rising earnings. With relative stability in vessel numbers in each fleet, average vessel revenues closely tracked trends in overall landed value (down by over 50% in 2005 from the 2004 averages). Average revenues for the full-time fleet peaked in 2004 at over $600,000, and then dropped to less than $300,000 in 2005. Average landings for the supplementary fleet dropped from about $260,000 to under $125,000, while the inshore fleet average dropped to about $13,500 in 2005 from $28,000 in 2004.

Fig. 4.16: Following a period of strong growth, average revenues dropped to 1998 levels in 2005. Further declines are expected in 2006 as industry faces weak markets, reduced landings and adverse exchange rate movements.

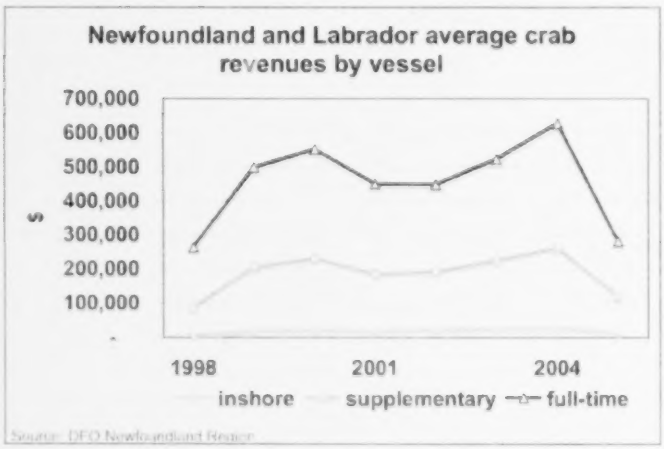


Table 4.6 provides a profile of fleet characteristics, with a snapshot of each fleet's dependence on the crab fishery. Notable are the few trips the fleets make to harvest their quotas, with trips lasting just one day for the inshore fleet, and 2-4 days for the supplemental and full-time fleets. Dependence on the crab fishery is greatest for the full-time fleet (64%), with many vessels fishing only crab and others also fishing shrimp. Many vessels in the supplementary fleet are active in other fisheries including lobster and shrimp, with dependence at 39%. The inshore fleet relied on crab for half its revenue in 2005. It should be noted that the dependence levels would have been much higher in previous years when average crab revenues themselves were higher. The fishery generates employment and income for an estimated 10,000 participants.

Table 4.6: Newfoundland snow crab fishery fleet profile, 2005

	Inshore	Supplementary	Full-time	Communal
License Holders	2434	677	71	8
Vessel length	<45	38-65	55-65	35-65
Quota (tonnes)	11,657	28,700	7,585	n.a.
Quota licence (kg)	4,789	42,393	106,831	n.a.
Season start	Apr-09	Apr-09	Apr-09	Apr-09
Season end	Jul-31	Jul-31	Jul-31	Aug-31
Trap limit (#)	150	800-300	800	n.a.
Average trips (#)	8	7	8	5
Average days fished (#)	8	17	28	18
Crew (include skipper)	2-4	3-4	4-5	n.a.
Landings*				
Crab (t)	10,232	26,091	6,180	502
Crab ($000s)	32,660	83,392	19,770	3,466
average licence (kg)	4,204	38,540	87,043	138,595
average licence ($)	13,418	123,179	278,451	433,250
Total all species ($000)	61,602	141,552	50,709	542
Crab as % of total	53%	59%	64%	99%

* Landed value based on agreed minimum prices. Actual value is unknown but probably higher.

Source: DFO Newfoundland Region

Nova Scotia

Average vessel revenues for all traditional fleets were below $100,000 as recently as 1998 (Fig. 4.17 shows results for the traditional fleets only). The average increased sharply in 1999 for the CFA 23/24 fleets in response to favourable resource conditions. By 2003 it had exceeded $500,000. Re-allocation coupled with declining resource and weak markets contributed to the drop of more than 50% by 2005. The pace of increase was much slower for the other fleets. The CFA 19 vessel average climbed to just over $200,000 in 2004, while CFA 18 (now integrated into CFA 12) increased from about $30,000 in 2001 to $200,000 by 2004. The traditional fleets in CFA 20-22 also benefited from resource and market improvements until 2003, with average vessel revenues rising to about $130,000. This dropped by almost 80% by 2005, resulting from the combined effects of re-allocation, sharply reduced TAC, and week markets.

Fig. 4.17: Average vessel revenues increased for all traditional fleets during the early 2000s. The drop after 2003 in the Eastern Nova Scotia fisheries (CFA 20-24) reflects reallocations, reduced abundance and weak markets.

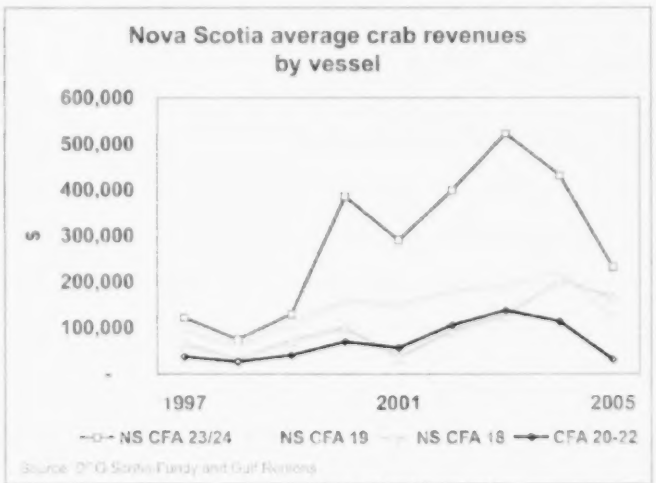


Table 4.7 provides a profile of fleet data, with a snapshot of each fleet's dependence on the crab fishery. Only data for licence-holders (traditional vessels) is shown in Table 4.7. Quota, season and operating data for quota-holders are comparable. Differing aggregation arrangements (varying number of quota-holders per licence) make it difficult to compute vessel average landings and value. The crab fishery generates employment and income for about 1,000 skippers and crew in the licence-holder category. An estimated 500-700 quota-holders also benefit.

In all areas but CFA 18, the seasons tend to start in June and July, 1-2 months after those in the major fisheries in the Gulf and off Newfoundland and Labrador. This reduces the overlap with the lobster fishery, but increases the likelihood of running into soft-shell problems. With crab grounds located close to shore, most fleets make trips lasting just one day. Where grounds are farther from shore (CFA 23/24) trips last up to two days. Dependence on the crab fishery is relatively high (ranging from 62 to 84%), reflecting either or both the limited participation in other fisheries and the low value of those fisheries. It should be noted that the dependence levels would have been much higher in previous years when average crab revenues themselves were higher.

Table 4.7: Nova Scotia snow crab fishery fleet profile (Licence-holders), 2005

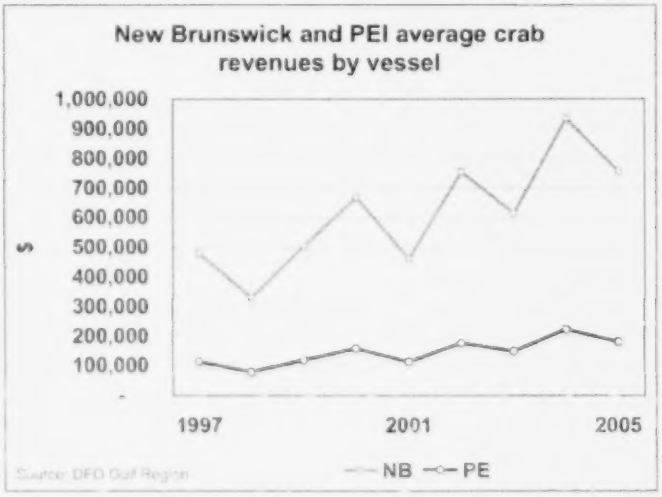
CFA	18	19	20-22	23	24
License Holders	30	111	74	39	38
Quota licence (kg)	35,531	25,928	7,068	55,282	55,316
Season start	May-02	Jul-14	Jul-22	Jun-17	Jun-17
Season end	Jul-15	Sep-06	Sep-22	Nov-01	Nov-01
Trap limit (#)	75	184	30	45	45
Average trips (#)	11	26	11	11	18
Avg. days fished (#)	11	26	12	24	29
Crew (include skipper)	3-4	3-4	2-4	3-5	4-5
Landings					
Crab (t)	1,064	2,828	540	2,141	2,089
Crab ($000s)	5,005	13,716	2,286	9,063	8,843
average licence (kg)	35,469	25,477	7,297	54,897	54,974
average licence ($)	156,417	123,566	30,889	232,381	232,704
Total all species ($000)	7,115	17,607	n.a.	n.a.	n.a.
Crab as % of total	70%	78%	62%	84%	74%

Source: DFO, Scotia Fundy and Gulf Regions

New Brunswick

Vessels in the CFA 12 traditional fleet have typically generated the highest average revenues from the crab fishery, rising from $300,000 in 1998 to over $900,000 in 2004 (Fig. 4.18). Year-to-year fluctuations from 2000 are due mainly to changes in abundance and TAC. The drop to about $755,000 in 2005 reflects a drop in the TAC as well as lower prices. Trying to compute vessel averages for the new entrants is problematic due to the complexity of allocation arrangements.

Fig. 4.18: Average crab revenue per vessel in the traditional fleets in CFA 12 (including CFA 25/26) showed an increasing trend since 1998. The wide fluctuations are due to shifts in resource abundance, though in 2005, weak markets also played a role.



Operating statistics for the New Brunswick-based CFA 12 fleet are shown in Table 4.8. The 76-vessel fleet of traditional licence-holders made 16 trips in 2005, averaging two days per trip. The fleet generated average landings of $757,000 in 2005 and depends on crab for 100% of its revenues. The non-traditional and First Nations fleets operate subject to the same season and trap limits. Computing vessel (or licence) averages for the new entrants is problematic due to the complexity of allocation arrangements.

Table 4.8: New Brunswick snow crab fleet profile (CFA 12), 2005

	Traditional	Non-Traditional*	First Nation**	Zone E
License Holders	76	8	7	6
Quota (tonnes)	13,044	2,024	2,772	280
Quota/licence (kg)	171,632	253,000	396,000	46,667
Season start	Apr-30	Apr-30	Apr-30	Apr-30
Season end	Jul-15	Jul-15	Jul-15	Jul-15
Trap limit (#)	150	150	150	75
Average trips (#)	16	n.a.	n.a.	n.a.
Avg. days fished (#)	32	n.a.	n.a.	n.a.
Crew (include skipper)	4-5	3-4	3-4	3-4
Landings				
Crab (t)	13,055	2,024	2,772	320
Crab ($000s)	57,562	8,926	12,225	235
average/licence (kg)	171,780	n.a.	n.a.	53,330
average/licence ($)	757,400	n.a.	n.a.	39,190
Total all species ($000)	57,562	n.a.	n.a.	n.a.
Crab as % of total	100%	n.a.	n.a.	n.a.

* Allocated to groundfish licence-holders (10%) and MFU (90%), with sub-allocations to members
** Communal licences
Source: DFO Gulf Region

The crab fishery generates employment and income for an estimated 340 skippers and crew in the traditional licence category. Another 150 or so may participate in the other licence categories; computing a precise figure is difficult because of the allocation arrangements.

Prince Edward Island

Average revenue for vessels operating in CFA 25/26 (now integrated into CFA 12) doubled between 1997 and 2004, rising from about $100,000 to just over $220,000 (Fig. 4.18). The drop in 2005 was due to the combined effects of reduced abundance and a fall in prices.

The 28 licence-holders ordinarily fish 4-6 weeks from the first week of May. In 2005, they made only seven trips lasting a day or less. Crab accounted for 77% of total revenue from fishing (Table 4.9). Computing vessel (or licence) averages for the new entrants is problematic due to the complexity of allocation arrangements.

Vessels in the traditional category generate employment for an estimated 100 skippers and crew. Another 100-125 participate in the non-traditional and First Nation fisheries, though precise figures are difficult to compute due to the allocation arrangements.

Table 4.9: Prince Edward Island snow crab fleet profile (CFA 25-26), 2005

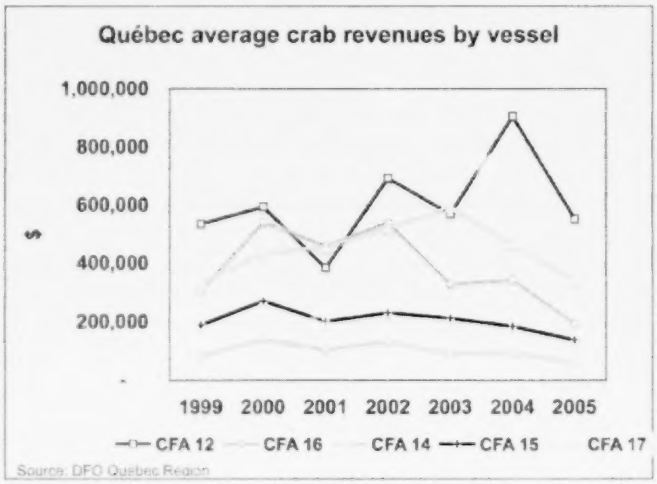
	Traditional	Non-Traditional*	First Nation**	Zone E
License Holders	28	2	2	1
Quota (tonnes)	1,141	603	279	46
Quota/licence (kg)	40,750	301,500	139,500	46,000
Season start	Apr-30	Apr-30	Apr-30	Apr-30
Season end	Jul-08	Jul-08	Jul-08	Jul-08
Trap limit (#)	75	150	150	75
Average trips (#)	7	n.a.	n.a.	n.a.
Avg. days fished (#)	7	n.a.	n.a.	n.a.
Crew (include skipper)	3-4	3-4	3-4	3-4
Landings				
Crab (t)	1,141	603	279	n.a.
Crab ($000s)	5,031	2,659	1,230	n.a.
average licence (kg)	40,750	n.a.	n.a.	n.a.
average licence ($)	179,679	n.a.	n.a.	n.a.
Total all species ($000)	6519	n.a.	n.a.	n.a.
Crab as % of total	77%	n.a.	n.a.	n.a.

* Allocated to groundfish licence-holders (12%) and PEIFA (88%), with sub-allocations to members
** Communal licences
Source: DFO Gulf Region

Québec

The past few years have seen a gradual decline in average landed value of crab for vessels in all areas but CFA 12. Changes in resource abundance account for much of the decline up to 2004, though re-allocation in CFA 15-17 is also a contributing factor. The trend worsened in 2005, as prices fell due to weak market demand. Average vessel revenues have dropped to or below levels experienced in 1999. The average in CFA 12 also declined in 2005 (from about $900,000 in 2004), but at $555,000 remains almost $200,000 above the low point in 2001.

Fig. 4.19: Average revenues for vessels in the Québec fleets have followed a declining trend since 2002-2003 and are at or below levels generated in 1999. Vessels in CFA 12 have enjoyed a generally rising trend since 2001, though revenues dropped sharply in 2005 in response to declining abundance and weak markets. In all cases, rising costs have eroded net revenues.



Operating statistics for the Québec fleet are shown in Table 4.10. Most vessels take in thee range of 15-20 trips lasting one day, with vessels in CFA 12A and 17 typically taking 30-35 trips each also lasting one day. Data indicate that the fleets rely exclusively or almost exclusively on crab, with dependence figures in the 89-100% range. Vessels employ 4-5 crew (including skipper), with the 152-vessel traditional fleet generating employment and income for an estimated 685 people.

Table 4.10: Quebec snow crab fleet profile (regular), 2005

	CFA 12	CFA 12 A,B,C	CFA 14	CFA 15	CFA 16	CFA 17
License Holders	44	21	21	8	39	19
Quota (tonnes)	7,236.0	598.5	402.5	328.8	2,275.6	1,963.5
Quota licence (kg)	164,455	28,500	18,690	39,850	57,060	103,342
Season start	Apr-30	Mar-28 Apr-18	Apr-25	Apr-11	Apr-11	Mar-23
Season end	Jul-15	Jun-30 Aug-6	Jul-30	Jul-30	Jul-30	Jul-15
Trap limit (#)	150	50 100 200	75 150	75 150	75 150	85 170
Average trips (#)	21	32 10 14	18	19	21	32
Average days fished (#)	25	34 15 16	19	19	23	34
Crew (include skipper)	4-5	4-5	4-5	5-6	4-5	4-5
Landings						
Crab (t)	7,236	691	405	329	2,278	1,966
Crab ($000s)	24,385	2,329	1,365	1,109	7,677	6,625
average licence (kg)	164,455	32,905	19,286	41,125	58,410	103,474
average licence ($)	554,212	110,889	64,993	138,591	196,843	348,706
Total all species ($000)						
Crab as % of total*	100%	89%	80%	97%	99%	94%

*Based on 2004 data
Source: DFO Quebec Region

5. ISSUES AND CHALLENGES

Key points

- Crab climbed from minor importance in 1990 (5% of total landed value), to become the most important species in the Atlantic fisheries in 2004 (34% of total landed value). Access to the resource more than doubled, rising from about 1,800 licence-holders to about 4,000. For all but two fleets for which data are available, the gross revenue from crab exceeds 60% of total fishing revenue. Dependence in most areas ranges between 75 and 100%. These dependence measures are based on 2005 data when crab revenue was down significantly from previous years. In other words, in the preceding years, dependence on crab would have been even higher for most fleets.

- In the decade prior to 2004, the harvesting sector enjoyed a relatively benign environment with generally favourable resource and market conditions. Even though prices fluctuated, they did so against a generally rising trend. The period was also characterized by relative stability among the factors influencing input (fishing) costs.

- Fishing seasons tend to be short, often no more than 6-8 weeks. Harvesters try to catch their quotas in as short a time as possible. There are several reasons for this: the need for income, to fish when catch rates are highest, to avoid the risk of closure due to soft-shell crab, and to ensure the highest quality catch (including the possibility of high-grading). Short seasons carry negative implications for the processing sector: high capacity requirements, gluts, poor quality and intense competition for raw material.

- Much has happened on all three fronts (resource, price and input costs) in the past two years to threaten parts of the industry with financial difficulty. Sharply declining prices and rising harvesting costs have caused margins to narrow considerably for many fleets. Some fleets have also experienced declining crab stocks, notably those in Newfoundland and Nova Scotia. Other fleets have not faced extended resource declines for some years, at least not yet. Stocks in CFA 12 have fluctuated against a generally rising trend, but weaker recruitment and declining abundance is expected for the next few years.

- Much of what happens to fleet economics in the next few years will depend on resource conditions in regional fisheries as well as in Alaska and Russia. Crab stocks off Newfoundland and Labrador appear to be at the trough of their cycle, with signs the resource will rebound in the next 2-3 years. Stocks in the southern Gulf appear to be at the top of their cycle, with signs of weak recruitment and decline over the next several years. Stocks on the eastern Scotian Shelf have declined and recovery is not expected until 2007-2009. Stocks in the northern Gulf appear to be at the end of a wave of recruitment with a conservative approach for 2006 indicated in order to preserve reproductive biomass.

- The net effect of increases and declines appears to be relative stability in overall supply within the regional fisheries for the next year or so. It is too early to know what will happen in Alaska for the 2007 season. A September announcement of an increased TAC in all likelihood would mean lower prices than in 2006. The Russian fishery remains an unknown quantity, though any supply increase from recent levels would have a depressive effect on prices.

Observations

Net revenues in the crab fisheries of the Atlantic Provinces and Québec have been squeezed not just by reduced prices, but also by rising operating costs (fuel in particular). In some areas where catch rates and landings are down, fleets are reported to be facing break-even operating conditions. For many of the larger vessels (>50') operating in the mid- to off-shore areas, the breakeven price is probably in the $0.90-1.00 range.

Fleets are adjusting to a lower net revenue regime by cutting costs where they can. This generally involves one or more of the following: cutting crew, reducing crew share, reducing trips by staying out longer and doubling up quotas on a single vessel.

- Cutting crew increases workload and may increase the risk of accidents.
- Reducing crew share makes the job of crewing less attractive. Harvesters in some areas are already expressing concern that it is becoming more difficult to find crews.
- Extending the length of trips saves on fuel costs arising from steaming to and from the fishing grounds, but it increases the risk of accidents, particularly if boats are fully laden some distance from shore.
- Doubling up quota, or allowing more flexibility in leasing or transferring quota, can reduce costs and makes sense as a long-term solution if capital exits the industry.

Looking ahead, it does not appear that conditions in the fishery are going to improve significantly within the next year. Overall TACs may decline. Markets are expected to remain weak and may decline further depending on the Alaska fishery. Fuel costs are not expected to decline and could increase further depending on the demand for diesel fuel by other sectors of the economy.

V

PROCESSING AND MARKETING

1. Overview

Virtually all the snow crab landed in Atlantic Canada and Québec is processed in one of the region's 80 or so processing plants. Little, if any, raw crab bypasses the processing sector for the live or restaurant trade. Virtually all the crab entering the plants is processed into one product – sections or clusters of legs. The process is straightforward, involving essentially four steps: butchering, cooking, freezing and packing. Most of the product is consumed in two markets: the U.S. and Japan, with some of the product destined for Japan taking a detour through China's low cost processing plants to extract meat for the sushi trade.

At this level of abstraction, the industry seems simple enough. There are challenges in selling (the industry does not market as such), though these pale in comparison with the challenge of securing raw material in the first instance. Processors do not have direct access to the resource. They secure supply from (mostly) independent harvesters at prevailing shore prices. Competition for raw material tends to be intense (demand outstrips supply), and in many areas, not limited to price. Processors (or independent buyers) offer a range of financial and non-financial incentives to secure supply. By their nature, the form and magnitude of these incentives are secret, making it impossible to determine the real shore price.

Though the harvesting sector fishes subject to individual quotas, the action on the water simulates a competitive fishery. Gluts and poor handling practices resulting in poor quality are not uncommon. Predictably, the processing sector over time has adjusted its capacity to meet seasonal peaks, resulting in excess capacity for much of the season. Intense, and often destructive, competition would be expected in the circumstances.

Several hundred million dollars passes from the processing to the harvesting sector in the space of a few weeks. This cash flow requirement puts tremendous pressure on processors to move product to market as quickly as possible. Processing, then, becomes a cash-driven enterprise leaving no time (and limited margin) to do anything but sell the product to the highest bidder as it is produced. This leaves little or no scope for market or product development. And nor does it leave sufficient margin to carry product in inventory waiting for higher prices.

This is not to suggest that all is gloom and doom for the processing sector. They have enjoyed some good years in favourable market conditions. Over the past several years, the turnover in plant ownership and exit from the industry were low, indicating a relatively stable operating environment. This seemed to change in early 2006 with the closure of three plants (all of which re-opened under new ownership), though factors beyond conditions in the crab market may have contributed. Nonetheless, the combination of poor market conditions, rising operating costs and a low-valued U.S. dollar could provide the basis for exits or consolidations elsewhere in the industry.

2. Sector profile

Industry structure

The processing sector consists of 83 plants distributed throughout the Atlantic Provinces and Québec. Since much of the supply from the harvesting to the processing sectors flows intra-provincially (with full or partial restrictions on exports of live crab in three of the five provinces), the processing sector can be considered as five distinct industries.

There is limited trade in raw material among the provinces, notably from PEI vessels to New Brunswick plants, and from Nova Scotia vessels to New Brunswick. Reliable estimates of the volume of trade are not available, but anecdotal evidence suggests the greatest flow is from PEI to New Brunswick. PEI plants have had difficulty competing with their New Brunswick counterparts, with only one or two plants operating in 2005 (six are licenced).

Table 5.1: Snow crab processing plants by province

	NL	NS	PE	NB	QC	Total
Licensed	38	155	6	22	25	246
Active	36	12	1	12	24	85

Source: Provincial departments of fisheries

Most of the plants are independently owned by local interests. Some of the larger Newfoundland-based companies own or control 2-3 plants in that province, with ownership interests in plants in Nova Scotia, PEI and New Brunswick.

In an effort to gain greater control over prices and to enhance overall profits, several groups of New Brunswick-based harvesters entered the processing industry in the 1990s, buying or building plants. All but 2-3 of these groups have divested themselves of their interests in the last 3-4 years. The main reason appears to be the relatively low margins earned in crab processing and the desire of owners (harvesters) to focus more on fishing where their original and more significant revenue interests lie.

The number of processors has increased over the past 5-10 years in response to rising landings.

- **Newfoundland and Labrador -** The greatest increase occurred here, where the industry expanded from 17 plants in the early 1990s to 42 by 2003 (now down to 38 of which 36 were active in early 2006). The issuance of new licences is subject to satisfying various criteria, including resource thresholds.

- **Nova Scotia -** Though some 155 plants have crab on their licences, only 12 plants have actually ever been active. Half the active plants entered the industry after 1999 with the rise in landings on the eastern Scotian Shelf. The oldest plant (in Cheticamp) closed early in 2006 when its parent company (Newfoundland-based) was forced into receivership, though it re-opened under new ownership. Nova Scotia imposes no regulatory restrictions on entry (other than meeting standard health and safety requirements).

- **Prince Edward Island** - the six licenced plants operated through the 1990s. Stiff competition for raw material from New Brunswick plants resulted in gradual attrition from the industry. There was no production in 2005, but in 2006 one plant re-opened.

- **New Brunswick** - These are among the oldest plants in the region, some dating to the 1970s and the development of the Gulf fishery. Consolidations and closures resulting from the wide swings in the resource have caused active plants to decline to 12 from a high of 22.

- **Québec** - The number of plants has been stable over the past five years, though the number active dropped from 25 to 24 in 2006. The plants are divided between the Gaspésie and Côte-Nord (ten each), with four on the Îles-de-la-Madeleine.

Plants vary greatly in their processing capacity, with smaller plants capable of producing in the range of 5,000 lb/hour (live weight) and the larger ones upwards of 20,000 lb/hour. As landings have increased and the weeks fished have declined, the processing sector in each province has adjusted its capacity (through additional plants or expansions of existing ones) so that each industry is more than capable of handling the seasonal peaks. This of course means that for much of the season plant capacity is underutilized, providing an incentive to bid aggressively for raw material.

Employment

In the range of 7,000-9,400 workers are employed directly in crab processing in plants around the region (Table 5.2). These are average weekly figures for the main part of the season; during the peak period (with 2-3 shifts working) the figure would rise to above 10,000. The jobs of many other workers are dependent on crab because of the role it plays in sustaining the operations of multi-species plants. Where plants process other species, workers can usually enough hours of employment to qualify for employment insurance. But for workers at specialized plants, the seasons are not long enough. As a consequence, plants are finding it increasingly difficult to attract workers, even in communities offering few alternatives.

Table 5.2: Estimate of crab processing sector employment by province, 2005

	Plants (1)	Live weight (2)	Output (3)	Hours worked (4)	Plant operations (5)	Person-weeks (6)	Number employed (7)
	#	tonnes	tonnes	000s	# weeks	#	#
NL	30	43,955	26,000	1,300-1,750	8-10	26,000-35,000	3,250-4,375
NS	10	14,427	8,945	430-570	6-8	8,600-11,500	1,075-1,435
PE	-	-	-	-	-	-	-
NB	12	19,565	12,130	580-780	6-8	11,700-15,600	1,460-1,950
QC	24	16,209	10,050	480-650	6-8	9,800-13,000	1,225-1,650
Total	82	94,156	57,124	2,800-3,750	-	56,100-75,100	7,000-9,400

Notes:
1. Plants active in 2005.
2. Assumes all or most of landings in province stay in province.
3. Assumes section production with 62% yield.
4. Based on 30-40 hours per tonne live weight.
5. Based on landings data.
6. Derived from hours assuming 5-day week at 10 hours/day, with plants working seven-day weeks and double-shifting.
7. Derived by dividing person-weeks by number of weeks worked. The figure represents plant workers actually employed in processing crab. These figures may differ from provincial employment estimates based on total workers employed in plants processing crab as well as other species.

In these circumstances, some governments feel obliged to fund job-creation programs. Millions of dollars are spent annually in such areas as Gaspésie, the Acadian Peninsula and much of the coast of Newfoundland and Labrador. These programs serve multiple objectives including community stability. While this is a laudable objective, there are side effects. These programs allow more capacity to remain in the industry than could otherwise be supported on plant economics alone. The inadvertent side effect, then, is to intensify that aspect of competition linked to excess capacity.

Production and exports

Atlantic Canada and Québec

Processing plants in the Atlantic Provinces and Québec produce almost exclusively crab sections. Product value increased steadily over the past decade, peaking at just under $900 million in 2004. A combination of weak markets and declining landings caused production to decline to just over $600 million in 2005, a drop of 30%. Export data are used as a proxy for production because only a very small quantity of processed crab finds its way onto the Canadian market.

Two-thirds of production is exported to the U.S., with most of the balance ultimately ending up in Japan (directly and via China where Canadian sections are sent for meat extraction and then re-exported to Japan). As recently as 1996, Japan was Canada's leading export destination. But a long-term decline in demand in Japan, coupled with an increase in Russian exports caused a gradual reduction in Canadian exports. They are down by about 30% since 1996, including the value of the re-export trade through China.

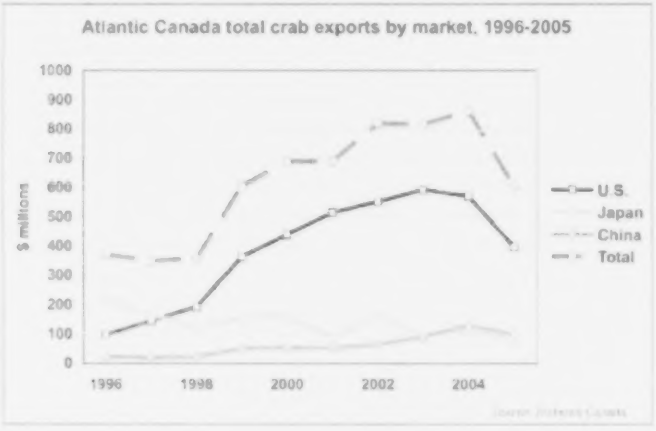
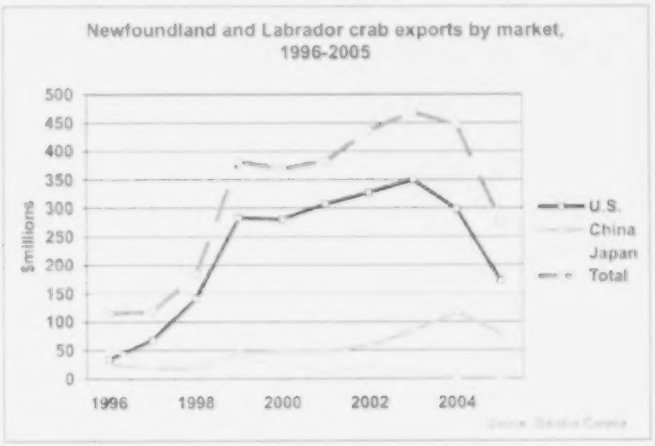


Fig. 5.1: The U.S. took over from Japan as Canada's leading export market in 1998. The U.S. takes about two-thirds of our crab exports. Most of the balance goes to Japan, directly and indirectly through China where sections are further processed to extract meat for the sushi market.

Newfoundland and Labrador

The value of production increased sharply during the late 1990s and early 2000s, rising from just over $100 million in 1996 to over $450 million in 2003. Reduced landings and weak markets caused product value to drop to about $275 million in 2005 (Fig. 5.2). The value of exports to the U.S. increased sharply during the late 1990s, continued to increase into the 2000s as landings rose, and then dropped abruptly as prices fell and landings declined. The Japanese market (via China) became more of a factor after 2002, so that by 2005 it accounted for about 30% of total export value.

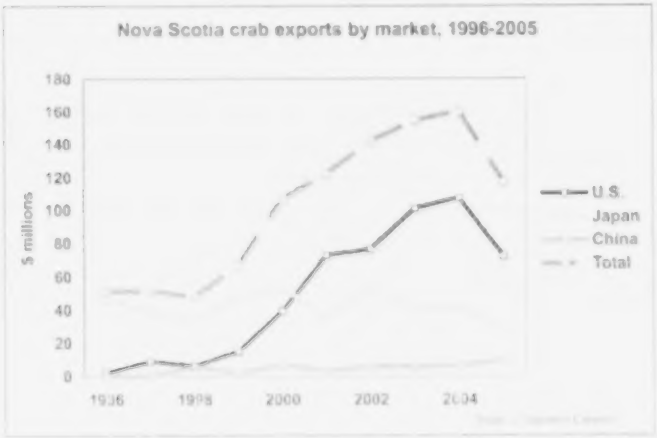
Fig. 5.2: The U.S. takes about 60% of Newfoundland's exports (by value). Japan takes about 40%, with most of it sent first to China for meat extraction. Newfoundland crab is preferred for the Japanese sushi market because of its relatively high meat content.



Nova Scotia

The value of production increased sharply in 1999, more than doubling from just under $70 million to $160 million in 2004. Reduced landings and weak markets caused product value to drop to just under $120 million in 2005 (Fig. 5.3). Japan had been the dominant market in the late 1990s, but was overtaken by the U.S. in 2001. Currently, the U.S. takes about 60% of exports, with the balance destined directly for Japan (sections) or indirectly through China or other Southeast Asia countries (for meat extraction).

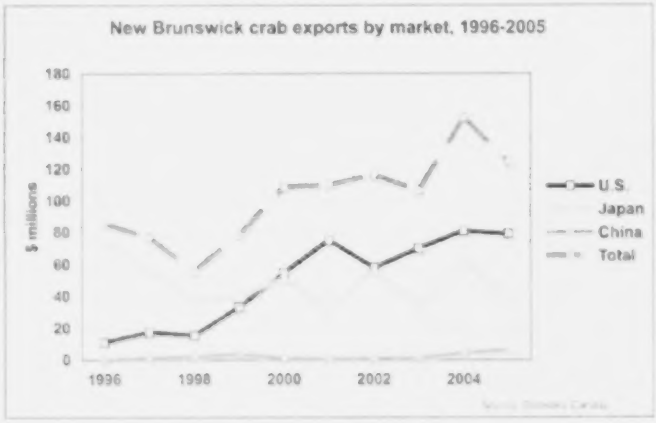
Fig. 5.3: Nova Scotia crab exports reached a peak of $160 million in 2004, then declined sharply to under $120 million in 2005 as landings declined and markets weakened. The U.S. is the main export market, followed by Japan.



New Brunswick

The value of production increased steadily after the late 1990s, climbing to over $150 million in 2004. Weak markets caused product value to drop to just over $120 million in 2005 (Fig. 5.4). Japan had been the dominant market in the late 1990s, and has remained so, albeit with value fluctuating widely from year to year. The U.S. currently accounts for about 65% of export value with most of the balance destined directly for Japan (sections) and some indirectly through China or other Southeast Asia countries.

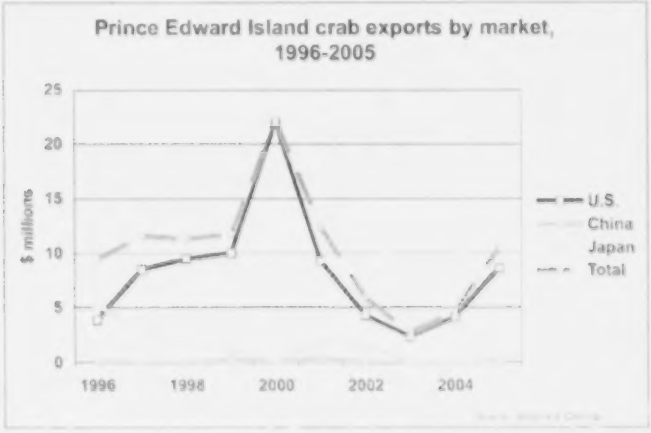
Fig. 5.4: New Brunswick crab exports peaked at over $150 million in 2004, then declined about $120 million in 2005 as markets weakened. The U.S. is the main export market (65%), followed by Japan (35%).



Prince Edward Island

The processing sector has faced difficult circumstances over the past few years and this is reflected in export (production value). Export value doubled between 1996 and 2000 as landings increased and markets improved. The sharp drop after 2000 was due to weak markets but also less production as plants ceased to produce. Improved markets in 2004 led to some recovery, with exports rising to $5 million and then to $10 million in 2005 (despite a downturn in the major markets). About 85% of exports go to the U.S.

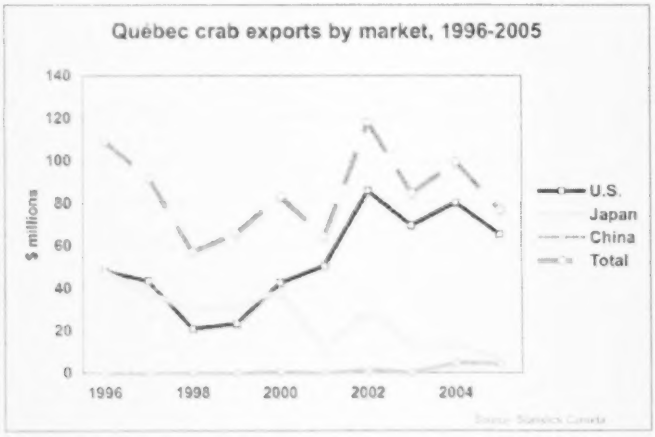
Fig. 5.5: Competition for raw material from NB has made it difficult for PEI plants to operate. Exports fell from over $20 million in 2000 to just over $2 million in 2003. At least one plant operated in 2005, exporting just over $10 million. About 85% of exports go to the U.S.



Québec

Production and exports have fluctuated widely over the past decade in response to resource and market conditions. Exports peaked in 2002 at just under $120 million, and then declined to under $80 million in 2005. The U.S. and Japan had been of equal importance to the industry until 2000, when U.S. importers sought replacement supplies following the collapse of the Alaska fishery. The U.S. currently takes 85% of Québec exports.

Fig. 5.6: The U.S. became the dominant market for Québec exports in 2001 after the collapse of the Alaska fishery.



3. Competition

Why structure matters

Companies in the processing sector compete in three markets:

- **raw material** – with each other for raw material supplied by independent harvesters
- **final product sales** – with each other (and suppliers of substitute products) for sales to importers and distributors who supply food service outlets and retailers in final product markets
- **local labour markets** – with other employers for production workers in local and regional labour markets.

Industry structure represents one of the key factors determining competitiveness in each of these markets. In fact, as we explore the various stages of the value chain and the technical and logistical challenges processing companies face in order to operate in the crab industry, it becomes clear that structural characteristics – particularly as these influence price formation in the port market – overwhelm all other factors in shaping the competitive environment.

The crab industry has essentially four levels along the value chain where structure could influence competition between sellers and buyers:

- **harvesters – processors**
- **processors – importers/distributors**
- **importers/distributors – food service/retail**
- **food service/retail – consumers**

The relevant structural characteristics are:

- **Industry Concentration** - The number and relative size of buyers and sellers provide an indication of market power and reflect the degree of competitiveness in an industry. Market power is normally expressed in terms of industry concentration: the share of sales or purchases accounted for by the largest individual sellers or buyers. In markets characterized by low concentration, each enterprise is a price taker because it accounts for a small share of sales or purchases. In markets characterized by high concentration, a few companies account for a large share of purchases or sales and are be able to exert influence over price.

- **Buyer-Seller Relationships** - Formal and informal links between buyers and sellers may limit the independence of each. The relationship is formal, for example, if the buyer owns the vessel and controls the catch. This is not permitted in Canada, though there are many exceptions in the form of trust arrangements. The relationship is informal if there is separate ownership of the harvesting and processing enterprises, but with arrangements between buyers and harvesters that provide some mutual guarantees. To the extent independent action by fishermen is constrained, transactions would not be subject to price competition from other buyers. This could affect price levels and the speed with which prices change in response to market conditions.

- **Entry and Exit Conditions** - Freedom of entry and exit are fundamental characteristics of a competitive industry. This means any new company or individual may begin selling or buying if it appears profitable to them to do so, or, conversely, may stop and leave the industry. It also means that existing participants have no way of barring the entry of others and there are no legal (regulatory) restrictions on entry or exit. Where barriers exist, industry price setting or investment behaviour may depart from that expected in a competitive industry.

Setting the shore price

Measured against these indicators, the crab industry conforms to the notion of a competitive industry, at least with respect to buying and selling at the initial (harvesting – processing) stage of the value chain. The limited and declining number and relative size of major importers/ distributors and food service/retail companies in the U.S., and importers in Japan, may be a cause for concern in terms of their ability to dictate price to processing companies. Table 5.3 provides an overview of structural issues and their influence on competitiveness at each stage of the value chain.

Maritimes and Québec

Harvesters act individually when selling crab, negotiating directly with buyers or processors. Paradoxically, though, through their communication networks harvesters effectively act in concert (informally) to drive the shore price uniformly to the highest level possible. Buyers/ processors are obligated to pay the prevailing shore price or lose the vessel's supply, not just for one trip, but *for the season* and possibly indefinitely. Moreover, the buyer risks losing all the other landings from that vessel. All the structural and operating conditions for both vessels and plants lead inevitably to supply-driven procurement. In short, despite their large numbers, the competitive balance tends to favour harvesters because of strong demand and finite supply over a relatively short season.

But if the industry conforms generally to the competitive model, it also departs from it in certain key ways. The structure of the fishing industry is such that there is a strong incentive for processors to try to avoid price competition when buying raw material. This is because they know that paying more for crab (or any other species) does not generally lead to increased supply for any individual plant, nor for the sector as a whole (because landings are quota-limited). As soon as one processor offers more, others are forced to pay the higher price or risk losing boats. Prices easily can be bid up to unprofitable levels resulting in a transfer of revenue from processors to vessels with no supply gain to any processor. For these reasons, non-price incentives (e.g., bonus payments, rebates, vessel financing, holidays, various gifts) are common in the industry.

Newfoundland and Labrador

A different approach to price formation occurs in Newfoundland and Labrador, at least in the initial stage. A minimum price is established through a formal process termed interest-based negotiation (also known as Final Offer Settlement). Though the process has evolved since it was introduced in 1998 (including an experiment with plant quotas in 2005), it contains essentially the same key elements:

- Time-limited negotiations between representatives of the harvesting and processing sectors to set a minimum price and to agree on conditions of sale (of crab), with the parties sharing market information provided by a three-person Special Standing Fish Price Setting Panel;
- In the event negotiations fail to produce agreement on price, the parties submit their final offer to the Panel;
- The Panel, considering conditions in crab markets, selects one or other of the prices submitted (the Panel may not set its own price) as the minimum season opening price to be paid;
- The opening price remains in effect for a specified period (2-3 weeks) and then may be adjusted upwards if market conditions have improved (it remains unchanged during this first adjustment period if market conditions deteriorate). It is adjusted every two weeks thereafter (up or down). A specified formula (the "price to market" formula) is used as be basis for adjustments. This formula links the minimum price to a market price factor based on: a) current U.S. and Japanese market prices for specific products, b) the product mix produced by Newfoundland and Labrador plants, c) the yield from whole crab to produce these products, and d) current exchange rates.

The parties fail to agree on a price most years; 2006 was no exception, and the matter was referred to the Panel. In a decision issued on April 5, the Panel set the opening price at $1.05/lb. Following the adjustment procedure, the reference price was eventually reduced, dropping to $0.92/lb in early June.

The opening price and subsequent adjusted prices represent the minimum processors must pay. In practice few trades are actually made at this price. Anecdotal evidence indicates actual prices paid in April ranged from $1.10 to $1.25/lb (when the minimum was $1.05/lb), with some reporting prices as high as $1.40/lb.

Table 5.3: Structure and competition along the snow crab value chain

	Harvester-Processor	Processor-Importer/Distributor	Distributor - Food Service/Retail	Food service/Retail - Consumer
Concentration	▪ Low – buyers and sellers ▪ Many vessels (4,000) ▪ Many plants (80), all with excess capacity	▪ Low on selling side (80) ▪ Moderate to high on buying side (5-10)	▪ Moderate to high on selling side (5-10) ▪ Moderate to high on buying side (5-10)	▪ Moderate to high on selling side (5-10 major retail food service chains) ▪ Low on buying side
Buyer-seller relationship	▪ Mostly independent ▪ Many informal ties, but do not affect need to pay prevailing shore price ▪ Price settlement process in NL sets minimum only; competition sets actual	▪ Independent on both sides ▪ Some program selling & season commitments, but most sales on spot market ▪ Short season, uncertainty and cash needs result in selling to distributors rather than customers	▪ Independent on both sides ▪ Distribution is specialized and companies don't want to compete with their customers	▪ Independent ▪ Some brand loyalties
Exit-entry conditions	▪ Sellers - limited entry, but access possible through licence transfer ▪ Buyers – entry restrictions in one province only; exit has proved difficult where plant is major employer	▪ Sellers – entry restrictions in one province only. Exit often difficult ▪ Buyers – high barriers to entry: capital, scale, knowledge, market share	▪ Sellers – high barriers to entry: capital, scale, knowledge, market share ▪ Buyers – high barriers to entry: capital, scale, knowledge, market presence	▪ Sellers – high barriers to entry: capital, scale, brand, market share ▪ Buyers – low barriers to entry: modest discretionary income
Assessment of competitiveness	▪ Highly competitive in all provinces ▪ Short season and excess capacity intensify competition ▪ Crab is key to processor access to other vessels' other species ▪ Generally a seller's market ▪ Harvesting sector takes 70-80% of final product value	▪ Fragmented industry leads to strong competition for sales among processors ▪ Few large importer/distributors play processors off against each other ▪ Short season & strong need for cash drives sales & creates commodity approach ▪ Narrow processor margins and cash flow needs create a buyer's market in most years, especially 2006	▪ Both sides have strong market presence providing basis for countervailing power ▪ Sellers offer range of products including crab substitutes ▪ Buyers control the outlets to consumers and select products and establish terms of sale (promotions) ▪ Balanced power means neither buyer's nor seller's market	▪ Strong competition for the consumer dollar ▪ Crab marketed as a commodity so is highly price sensitive ▪ Availability of substitutes imposes a price ceiling

Paying above the negotiated price is nothing new in Newfoundland; the practice has been going on for many years (well before the introduction of Final Offer Settlement in 1998). The premium over the minimum varies with the quota the vessel carries, the quality of the crab, and attractiveness to the buyer of other species the vessel is licenced to catch. For obvious reasons, how much additional revenue the vessel may receive and in what form are closely guarded secrets.

The main point in all this is that even though a formal price-setting mechanism exists in Newfoundland and Labrador, it establishes only a minimum price. The actual prices paid are the outcome of exactly the same kind of competitive environment that exists in the other provinces. The bargaining is fairly chaotic at the outset as buyers and sellers converge on a price. They also engage in less public negotiations (one-on-one) in cases where the buyer or seller feels the value proposition warrants (e.g., higher volumes, better quality). The actual basis of trade may include a price premium and/or some form of side payment. Economists refer to this as price discrimination, a common practice in markets where buyers or sellers have the ability to deal one-on-one to reward some aspect of the terms of trade (e.g., high volume).

The value chain

The value chain for exports to the U.S. market is depicted in Fig. 5.8, with a build-up of unit values for product at each stage. These values are based on 2005 market conditions, with information on market structure and price build-up based on discussions with processing companies. Note the build-up of price from harvester to processor takes the yield loss into consideration.

Price starts with the consumer who seems prepared to pay no more than US$5.00/lb (retail promotion) to US$8.00/lb (buffets) for snow crab sections. Retailers want to earn 30-35% mark-up on promotional items. Restaurants ordinarily aim for a 300% mark-up, but the mid- to low end buffets handling crab accept less. To achieve these mark-ups, retailers and restaurants could pay distributors no more than about US$3.75/lb. Distributors (who buy and sell) take a position in the market, essentially behaving like commodity traders. They took a large risk in 2004, bidding up the price for crab to a level higher than the market was apparently willing to bear (over US$4.00/lb) and leaving them with unsold inventories. Prices dropped in 2005, and continued their decline into 2006.

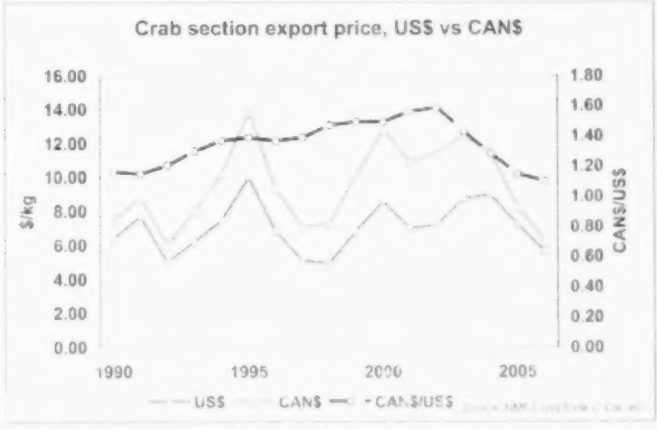
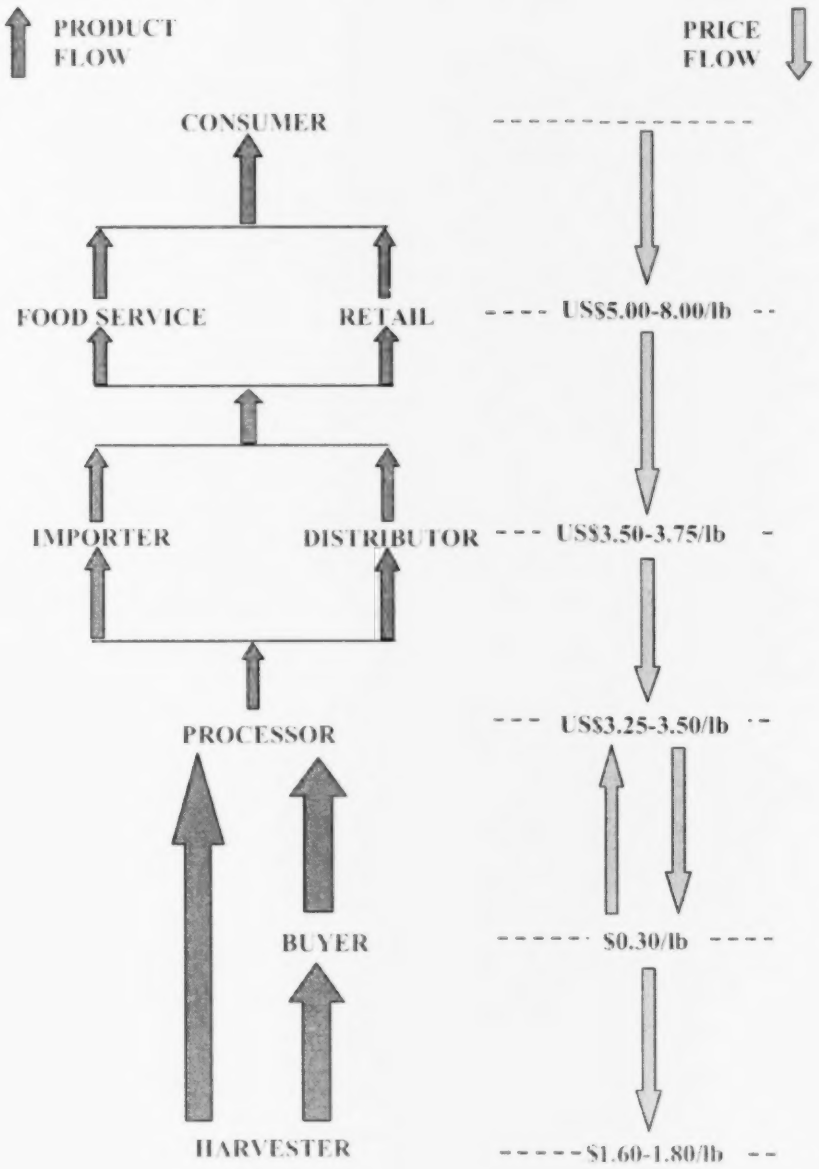


Fig. 5.7: Long-term export price for crab follows a cyclical pattern, falling into the US$6.00-8.00/kg range (US$2.75-3.65/lb) in most years. The US market price is in the low end of the range in 2006. At the current exchange rate, the price in Canadian funds is at its lowest point in 15 years (equaled only in 1992 when Alaska catches reached an all time high).

Fig. 5.8: Snow crab value chain, 2005



Revenue sharing

How product revenues are shared between processors and harvesters reflects the competitive balance between the sectors. The respective proportions depend on the structural characteristics outlined above and how these shape bargaining strength. There is no "normal" or "ideal" position such as 50:50 or 60:40; the balance will shift as structural characteristics change. But where the balance lies is important because if it is skewed too far in one direction or the other, it could compromise the ability of one or other sector to operate effectively, thereby potentially weakening the industry as a whole. The idea is to not kill the cow you are trying to milk.

The harvesting sector share of export price (industry revenue) ordinarily ranges between about 70 and 80% of export value. It climbed above 80% in 2003 and exceeded 90% in 2004 as market prices increased and competition for raw material intensified. Processors overpaid in 2004 and adjusted shore prices to more moderate levels in 2005 as the market weakened and export prices fell. The harvesting sector share fell to about 65%. Further weakness in 2006 led to even lower export prices (the US$2.85/lb range), with the shore price also dropping in response (to the CAN$1.25/lb range). Preliminary data suggest the harvesting sector share of industry revenue remains at about 65%.

Two points should be noted. First, the harvesting sector share shown in Fig. 5.9 is based on the effective price of raw material. This is the shore price paid by processors adjusted upwards to account for product yield (62%). Second, the share in any given year reflects not just the relative bargaining strength of the parties, but also the size of the absolute market price (in other words, it is partly an arithmetic result). A processor must realize a minimum gross margin (say, in the range of $1.00/lb) in order to cover operating costs. The lower the export price, the higher the share this margin represents.

- Shares remained unchanged during a period of rising export prices (e.g., 1999-2000), suggesting balanced bargaining strength.
- The harvesting sector share rose during the next rising market (2002-2004), indicating that intense competition amongst processors (buyers) had shifted the balance in favour of harvesters. At peak (2004), processors had bargained away all but about 10% of the export price.
- The processors' share increased in relative terms as market prices dropped in 2005 and 2006.

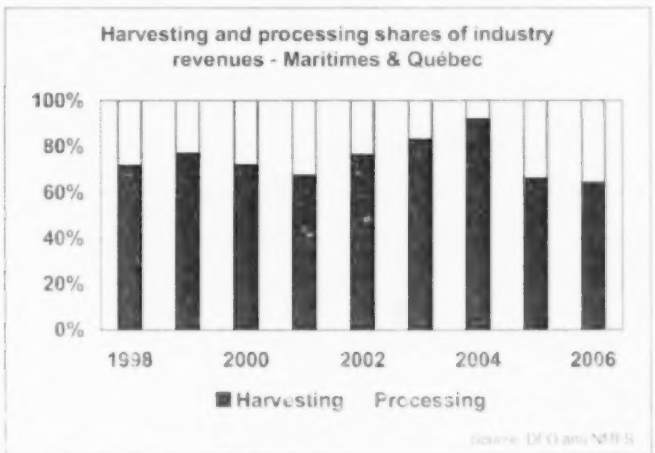


Fig. 5.9: The processor share of industry revenues declined in the early 2000s due to intense competition for raw material as market conditions improved. By 2004 when the market peaked, harvesters had gained about 90% of industry revenues. The norm seems to be in the 65-75% range. Note that this calculation of revenue shares is based on the shore price adjusted upwards to account for the 38% yield loss.

4. Issues and challenges

Key points

- The region's 82 active processing plants produce a single product: crab sections. The industry did produce various meat packs at one time, but this is no longer economically viable due to the combined effects of reduced demand in the U.S. and relatively low processing costs in China (mainly for the Japanese market).

- Local interests independently own most plants, with some cross ownership. Crab harvesters had owned several plants in New Brunswick, but this has diminished in the past few years. Newfoundland-based companies have ownership interests in plants in the Maritimes and Québec.

- The processing sector employs an estimated 10,000 workers at the peak of the season. They are engaged in crab processing for no more than 6-10 weeks each season. The short season and nature of the work is making it increasingly difficult to attract and retain workers.

- Most plants in the sector operate independently from their source of raw material. Vertical integration is an exception in the industry. Plants have little or no control over the timing and rate of supply of raw material.

- The fishery, though operating with individual quotas, closely approximates conditions in a competitive fishery: a race for fish, short seasons, gluts, and in some cases poor quality. The processing sector in each province has adjusted to the landings profile by building enough capacity to meet the seasonal peak. Adjustments to fishing areas have also contributed to overcapacity in the processing sector, as some plants no longer have access to the level of resources they once did. Plant processing capacity varies from 5,000 to upwards of 20,000 lb/hr, with most plants operating two 10-hour shifts at peak times.

- All or most of the raw material flowing through each plant is sourced from local vessels. Inter-provincial trade is not well documented, though anecdotal evidence suggests it is limited. The greatest trade flows from PEI-based vessels to NB-based plants, with some flow from NS to NB as well. Two provinces have blanket restrictions on trade of live crab: Newfoundland and Labrador and Québec, while Nova Scotia restricts trade to Newfoundland and Labrador and Québec because of their policies.

- The U.S. is the dominant market, taking about 70% of total production. The balance goes directly to Japan, or indirectly via re-export through China where meat is extracted for the sushi market. Such high dependence on a single market, particularly one as narrow, commodity-based and price sensitive as the U.S. leaves processors in a vulnerable position.

- The fishery and competition for raw material shape the industry and its ability to compete effectively in export markets. Short seasons and excess processing capacity lead companies to volume-driven behaviour, bidding aggressively for raw material. This results in the need for immediate sales, leaving processors little or no opportunity for market or product development, or to hold supply in inventory in an effort to secure better prices. Processors then compete against each other for sales facing large importers and distributors who understand very clearly the cash flow pressures. Of course, adding to the narrow market dependence is the ease with which product could be disposed of, particularly during the profitable times when exchanges rates were more favourable.

Observations

The crab industry is structured to under-perform. Unlike most other industries, production decisions are made in response to supply conditions, rather than market demand. All key decisions taken by the processing sector, whether on capacity, raw material purchasing (rate, quantity and quality), production schedules or product sales, are subordinate to operating conditions in the harvesting sector. The realities of competition between buyers (processors) and sellers (harvesters) is such that the shore price has little or no meaning as a mechanism for influencing the characteristics of supply (quality, quantity, timing), except in circumstances where it is so low that no supply is forthcoming.

The main implication of these structural and operating constraints is that processors are forced to take the market as they find it on a day-to-day basis. They have little or no ability to plan or work out marketing arrangements with customers that could result in higher prices. They rely on importers and distributors to channel their output. In short, they are unable to be market-driven – to work from the market back to production. All their decisions are based on supply conditions.

As such, the main driver is the need for cash to pay for raw material. To put this in perspective, the processing sector had to generate over *$600 million* in 2004, most of this in the space of 6-8 weeks. This places considerable pressure on processors to turn over product as soon as possible. Undisciplined selling limits the bargaining strength they would have with importers and distributors. Of course, Canadian processors are always price takers in the global seafood market, but this would make them even more vulnerable to the power of large importing and distribution companies.

An interesting question is whether having an industry with greater control over raw material supply conditions (either through price or vertical integration) would produce a different outcome (i.e., less vulnerable, more profitable). After all, Canadian snow crab supplies two-thirds of the market. It should be possible to exert some market power in these circumstances. While possible, it is unlikely unless the industry were to approach the market with a more united (or disciplined) front on product supply and pricing issues. In other words, it assumes the industry could behave in a less fragmented way, seeing the competition not as each other, but suppliers of substitute products and the distributors who handle them.

VI

INDUSTRY OVERVIEW

1. Issues

Five main issues confront the Atlantic crab industry in mid-2006. Some of these issues have developed in the past 2-3 years, while others are part of the on-going challenge of operating in an environmentally and economically sustainable fashion. All contribute to a greater or lesser degree to chronic *instability* in the industry.

- **Resource sustainability** - Uncertainty surrounds the reliability of biomass estimates in many areas. The impact of high exploitation rates on stock structure is unknown. Crab fishing seasons may compromise sustainability objectives if they are set too early in spring or too late in summer.

- **Markets** - The industry relies almost exclusively on two markets, the U.S. and Japan, leaving it vulnerable to the growing power of fewer, larger importing and distribution companies. The market weakness that began 2004 and carried over into 2005 and 2006 is attributable in part to dependence on these oversupplied markets.

- **Supply-driven industry** - Industry structure, characterized by independent harvesting and processing sectors, creates a competitive environment that subordinates the processing and selling of crab to raw material supply pressures rather than to market conditions. This creates major challenges for processors and limits the prospects for market and product development.

- **Competing fisheries** - Overall supply of snow crab and substitute crab products have been the main factors contributing to price swings in the past. The major sources of competition (and uncertainty) are the Alaskan and Russian snow crab fisheries, and the U.S. fisheries for Dungeness and other crab species.

- **Industry viability** - This has declined in the past three years due to adverse shifts in prices and exchange rates, and to rising fuel costs. With shore prices approaching breakeven levels for some fleet sectors, vessels face difficult operating decisions regarding crew size, wages and the number of trips. Each of these carries implications for raw material and product quality.

2. Resource – cyclical abundance

Short-term outlook

A review of the 2006 stock advisory reports provides limited basis for short-term optimism. The overall TAC may decline from the 2006 level, reflecting a mix of stability, modest increase and possible decline, depending on area. No area is experiencing a strong recruitment pulse that would provide the basis for significant growth in exploitable biomass in the next 2-3 years.

- **Newfoundland and Labrador -** Biomass indices have declined in several areas, and while short-term recruitment has improved in some areas, long-term recruitment prospects are uncertain. DFO is following a cautious approach in setting the TAC and has introduced new management measures following the advice of the FRCC in its 2005 report.

- **Eastern Nova Scotia -** Abundance has declined since 2001, and continues to decline despite a 50% reduction in the TAC since 2004. Recruitment into the fishery has been weak for the past few years. Recovery could begin as early as 2007, though this is dependent on reducing fishing pressure on immature and soft-shelled crab in 2006.

- **Southern Gulf of St. Lawrence -** The stock is in a declining phase of recruitment until 2010. The 2006 TAC was set 20% lower than in 2005. Lower TACs can be expected for the next few years. Since about 2000, the fishery has become largely dependent on annual recruitment rather than remaining biomass, reflecting relatively high fishing pressure on the resource.

- **Northern Gulf of St. Lawrence -** Most crab populations are nearing the end of a recruitment wave, reflected in high commercial biomass and weak recruitment. TACs remained stable for the past three years following a sharp drop from 2002. It is likely that exploitable biomass will begin to decline in 2007.

Observations

For DFO, the challenge is to manage for resource conservation and sustainability, and to resist the short-term pressures for increased access and higher TACs. The current management regime, with its array of restrictions and controls, provides the Department with all the tools it needs to meet conservation and sustainability goals. But experience shows that this is not enough to ensure sustainability.

At issue is whether the Department has the knowledge and support from industry it needs to apply these tools effectively. In its 2005 report, the FRCC cites several areas where important biological knowledge is lacking. This underscores the need for caution in setting TACs (and resisting the pressure to set them at levels inconsistent with sustainability principles). It also highlights the need for investing in improved scientific research into population dynamics and abundance. Effective application of conservation measures also requires support from industry. This means strict observance of stringent soft-shell protocols, proper discard handling, no high-grading, no illegal fishing and effective at-sea monitoring.

The immediate challenge for industry is to deal with the decline in resource abundance at a time when markets are weak and costs rising. The challenge varies by fleet sector depending on the size of individual quotas and the cost structure. Many enterprises with smaller quotas are likely to face a difficult operating environment until resource and market conditions improve. Putting pressure on government to increase TACs or to engage in illegal harvesting practices may provide short-term relief, but industry is likely pay a high price in terms of conservation and sustainability.

Areas of uncertainty

What is known about crab biology provides the basis of current management measures. But much is unknown and this poses a threat to snow crab conservation. Included among the areas of uncertainty are the effects of:

- high exploitation rates on the number of males available for mating. The concern is that depletion of mature males may leave too few to mate with available females.
- high exploitation rates on the size at maturity of males. The risk is that small crab may reach terminal moult below the commercial size and not be available to the fishery.
- exploitation over the entire range of the species in Canadian waters. By fishing over the entire distribution of the crab population, the resource is left with no reserve or buffer against over-fishing.
- harvesting a high proportion of large males. Targeting large males may result in genetic change, shifting the population to sizes below the current commercial size.
- poor understanding of stock structure. How stocks in one area affect stocks in other areas is not well understood. This means that a high exploitation rate in one area could have a detrimental effect on the population in another area.

Experience shows that snow crab fisheries run the risk of collapse if not managed to prevent unsustainable fishing practices. Using many of the same management measures currently used in the Atlantic snow crab fishery did not prevent the collapse of the Bering Sea snow crab stock.

3. Markets – narrow and price sensitive

Short-term outlook

Snow crab is a commodity product supplied in about equal proportions to two markets, the U.S. and Japan. The market has a total of demand of about 150,000 tonnes (live weight), of which Canada supplies about 70%.

Snow crab demand has been fairly stable over time, with the seven major price swings since 1990 due mainly to abrupt changes in supply. The 2005 price drop came as the result of shifts in both demand and supply. With stable supply in the early 2000s, rising demand had resulted in steadily rising prices. In 2004, the industry (producers and distributors) tried to pass on higher prices than retailers and the food service sectors were prepared to pay (over $US4.00/lb). Sales slowed, leaving considerable quantities of snow crab in inventory in the U.S. This response was facilitated to a large extent by an increase in supply of substitute products, Dungeness crab in particular. Wholesale prices for snow crab had to drop before sales could be made, resulting in financial losses on inventory that had been carried by distributors through 2005.

Processors continue to feel the effects of the market upset in 2006, with prices at or below 2005 levels. The market is gradually returning to stable conditions, but a period of relatively low prices is needed to restore confidence and induce retailers/food service companies to buy crab again. U.S. snow crab wholesale prices have not moved appreciably since the beginning of the 2006 season. Market reports in mid-July indicate light inventories and some strengthening of the market.

The outlook for 2007 and beyond is largely conditional on what happens to overall supply. The Alaska snow crab fishery poses the greatest threat to market stability (though the Russian and Greenland fisheries also pose threats). Stock abundance and harvests have swung widely since 1990, sending prices skyrocketing and plummeting on several occasions. Stock abundance and the Alaska TAC increased for the first time in five years in 2006. If this is the leading edge of another spike in abundance, then prices could reach the record low levels experienced in 1997/98. On the other hand, the possible decline in Canadian supply over next few years could at least partially offset any increase in Alaska supply leaving prices relatively unchanged.

Though further price weakness is a possibility, prices in 2006 are approaching a floor dictated by harvesting costs. In other words, supply would decline as prices fell below the break-even cost of harvesting. And with reduced supply, prices would rise again. What the break-even cost is not known with confidence, but for the larger vessels in the Canadian fishery (that account for much of supply) it probably lies in the range of CAN$0.90-1.00/lb. It may be as low as US$0.65-0.75/lb in Alaska (which now has fewer than 90 large vessels fishing active in the fishery).

Observations

The crab industry at times defies reason. The price swings resulting from changes in supply are easy to understand. This is elementary economics. The price drop in 2005 resulted from a reaction that began on the demand side and presents more of a challenge to comprehension.

It seems that everyone in the industry knows that when the wholesale price of snow crab rises above US$4.00/lb customers (retailers, restaurant chains and casinos) back away from the product because they cannot realize sufficient margin at the maximum prices they are able to charge consumers. Yet, in full knowledge of this, importers and distributors bid up the price to levels above the magic $4.00/lb level. Perhaps they expected things would be different this time and it was worth a try in what they may have perceived as strong market conditions. Perhaps they were not aware that abundant supplies of moderately priced substitutes were available (though they no doubt handle these products as well).

The lesson seems to be that from time to time reason takes a back seat to the appetite for profit and risk, with participants blind (or indifferent) to the mistakes of the past. If that is truly the case, then bouts of instability can be expected to occur with some regularity.

Looking ahead, the major concern on the horizon for Canadian industry is likely to be the prospect of a recovery of the Alaska fishery. The market as it is currently constituted (narrow and price-sensitive) is unlikely to be able to absorb increased supply without a fall in prices from historical norms (say, in the US$3.00-3.50/lb range). A long-term price at the lower end of this range would mean some adjustment for the Atlantic crab industry.

Areas of uncertainty

Several factors in the global market create an uncertain environment for the Atlantic crab industry:

- Snow crab supplies from other fisheries may rise or fall sharply causing potentially wide fluctuations in price. Such supply shifts are difficult to predict far in advance given the nature of crab population dynamics. The TAC for the Alaska fishery is set in September, effectively giving the Canadian industry six months notice of where prices are headed. Statistics on the Russian fishery are believed to be unreliable given the reports of illegal fishing and misreporting.

- Supply conditions and potential for snow crab substitutes are largely unknown. Snow crab markets in the U.S. and Japan are influenced by other species including Alaskan king, Dungeness and Angulatus crab. As with Alaskan and Russian snow crab, predicting supplies more than a few months into the future is either difficult or impossible. Nonetheless, industry must monitoring developments in these fisheries (all are U.S. based) in order to anticipate their impact on the market.

- There is limited knowledge of potential markets outside the U.S. and Japan. The EU is a major market for crab, though much of the demand is for local species. Until a concerted effort is made to develop a demand for now crab, the market potential remains largely unknown and completely untapped.

- There appears to be limited knowledge of market potential in Canada. Snow crab is available in limited quantities in some regions, but there is little or no promotion or market development.

4. Harvesting – prone to wide revenue swings

Short-term outlook

Crab ranks just behind lobster as the most important species in the Atlantic fisheries. About 4,000 licence-holders have access to the fishery, suggesting that upwards of 12,000 harvesters benefit directly from the fishery. For all but two fleets for which data are available, the gross revenue from crab exceeds 60% of total fishing revenue. Dependence in most areas ranges between 75 and 100%. In light of access arrangements and resource and market conditions, this level of dependence is not expected to diminish in the near future.

Fishing seasons tend to be short, often no more than 6-8 weeks. For conservation reasons, the seasons would be at best no longer than 12-14 weeks. But harvesters try to catch their quotas in as short a time as possible. They need income, they want fish when catch rates are highest, they want to avoid the risk of closure due to soft-shell crab, and they want to ensure the highest quality catch (including the possibility of high-grading).

The harvesting sector had enjoyed several years of rising catches and strong prices prior to 2005. Many fleets now face significant financial difficulty. Sharply declining prices and rising harvesting costs have caused margins to narrow considerably for many fleets. Some fleets have also experienced declining crab stocks, notably those in Newfoundland and Nova Scotia. Other fleets have not faced extended resource declines for some years, at least not yet. Stocks in CFA 12 have fluctuated against a generally rising trend, but weaker recruitment and declining abundance is expected for the next few years.

The net effect of anticipated increases and declines in the various crab fishing areas appears to be relative stability in overall Atlantic supply for the next year or so. It is too early to know what will happen in Alaska for the 2007 season. A September announcement of an increased TAC in all likelihood would mean further downward pressure on prices. The Russian fishery remains an unknown quantity, though any supply increase from recent levels would have a depressive effect on prices.

Observations

Net revenues in the crab fisheries of the Atlantic Provinces and Québec have been squeezed not just by reduced prices, but also by rising operating costs (fuel in particular). In areas where catch rates and landings are down, some fleets are reported to be facing break-even operating conditions.

Fleets are adjusting to a lower net revenue regime by cutting costs where they can. This generally involves one or more of the following: cutting crew, reducing crew share, reducing trips by staying out longer and doubling up quotas on a single vessel. These actions carry a range of implications:

- Cutting crew increases workload and may increase the risk of accidents.
- Reducing crew share makes the job of crewing less attractive. Harvesters in some areas are already expressing concern that it is becoming more difficult to find crews.
- Extending the length of trips saves on fuel costs arising from steaming to and from the fishing grounds, but it increases the risk of accidents, particularly if boats are fully laden some distance from shore.
- Doubling up quota, or allowing more flexibility in leasing or transferring quota, can reduce costs and makes sense as a long-term objective to remove capital from the industry.

The general challenge facing industry is to be able to adjust to the inevitable ups and downs in resource and market conditions. This is in part a management issue because it carries inevitable demands for higher TACs in the event markets or the resource turns down. With the exception of a very few of the crab fisheries, the harvesting sector lacks a mechanism facilitating automatic adjustment to match capacity (cost) with resource availability (revenue). Tradable quotas or units of capacity could form the basis of such a mechanism. Government and industry may wish to consider this.

Areas of uncertainty

The major knowledge gaps with respect to the harvesting sector concern the lack of reliable information on:

- Costs and earnings for the various fleets - Without such information it is not possible to determine fleet viability in varying resource and market conditions. This makes it difficult to develop and apply policy to address resource or revenue upsets, or cost increases facing the industry. Without this knowledge, even such crucial management decisions such as setting TACs and quotas are taken in a vacuum.
- Labour supply - The ability of vessels to retain crews in the current market circumstances. Anecdotal evidence suggests vessels are facing difficulties because incomes have dropped. Without accurate information it is difficult to gauge the seriousness of the issue, and if serious, what steps if any industry and government need to take to address it.

5. Processing – structured to under-perform

Short-term outlook

The region's 80 or so processing plants employ over 9,000 people and produce essentially a single product: crab sections. The industry did produce various meat packs at one time, but few do so today. This is no longer economically viable due to the combined effects of reduced demand in the U.S. and relatively low processing costs in China for the Japanese market. Shifting back to value-added production is unlikely in the current environment.

The U.S. is the dominant market, taking about 70% of total production. The balance goes directly to Japan, or indirectly via re-export through China where meat is extracted for the sushi market. Such high dependence on a single market, particularly one as narrow, commodity-based and price sensitive as the U.S. leaves processors in a vulnerable position. Unless and until processors develop new markets, for example in the EU or Canada, this vulnerability can be expected to continue

All or most of the raw material flowing through each plant is sourced from local vessels. Inter-provincial trade is not well documented, though anecdotal evidence suggests it is limited. The greatest trade flows from PEI-based vessels to NB-based plants, with some flow from NS to NB and vice versa. Two provinces have blanket restrictions on trade of live crab: Newfoundland and Labrador and Québec, while Nova Scotia restricts trade to Newfoundland and Labrador and Québec because of their policies.

The fishery and competition for raw material shape the industry and its ability to compete effectively in export markets. Short seasons and excess processing capacity lead companies to volume-driven behaviour, bidding aggressively for raw material. This results in the need for immediate sales, leaving processors little or no opportunity for market or product development, or to hold supply in inventory in an effort to secure better prices. Processors then compete against each other for sales facing large importers and distributors who understand very clearly the cash flow pressures. The basis for a change in these circumstances is not on the horizon. Accordingly, stronger financial performance in the processing sector is likely to remain elusive.

Observations

The crab industry operates below its potential. Unlike most other industries, production decisions are made in response to supply conditions, rather than market demand. All key decisions taken by the processing sector, whether on capacity, raw material purchasing (rate, quantity and quality), production schedules or product sales, are subordinate to operating conditions in the harvesting sector. The realities of competition between buyers (processors) and sellers (harvesters) is such that the shore price has little or no meaning as a mechanism for influencing the characteristics of supply (quality, quantity, timing), except in circumstances where it is so low that no supply is forthcoming.

The main implication of these structural and operating constraints is that processors are forced to take the market as they find it on a day-to-day basis. They have little or no ability to plan or work out marketing arrangements with customers that could result in higher prices. They rely on importers and distributors to channel their output. In short, they are unable to be market-driven – to work from the market back to production. All their decisions are based on supply conditions.

As such, the main driver is the need for cash to pay for raw material. To put this in perspective, the processing sector had to generate over *$600 million* in 2004, most of this in the space of just 6-8 weeks. This places considerable pressure on processors to turn over product as soon as possible. Undisciplined selling limits the bargaining strength they would have with importers and distributors. Of course, Canadian processors are always price takers in the global seafood market, but this makes them even more vulnerable to the power of large importing and distribution companies.

Adding to the challenge of structuring the industry so that it meets its potential is the separate jurisdiction over the parts. The federal government has jurisdiction over the fishery, while the provincial government is responsible for processing (though not trade). If the objectives of the two levels of government are not aligned, this may contribute to the challenges the industry faces in operating more effectively.

Areas of uncertainty

The operating characteristics of the processing sector are not well documented. Information about the sector varies from province to province, but only one province systematically compiles operational data. The lack of information limits the scope of analyses that can be carried out and also presents difficulties for governments with responsibilities for economic and social development at the community level.

- **Viability** - little is known about the financial health of crab processing plants and their ability to weather the kind of circumstances the industry currently faces – the simultaneous impact of reduced supplies of raw material, low prices and rising costs. At least four plants were placed in receivership in 2006. Whether others follow is not clear.

- **Industry statistics** - not all provinces are able to respond to questions about plant capacity, throughput and employment. This basic "boilerplate" information would be useful in understanding the industry's economic impact in communities and regions.

- **Markets and market potential** - provincial governments do not systematically collect production and export data from plants. Market information is derived from Statistics Canada export data. This is fine as far as it goes, but is insufficient to gain insights into market dynamics and the factors behind price shifts. Some provinces engage the services of a market specialist to provide such information and this represents an important contribution to improving understanding of existing markets. Further work needs to be done by industry to identify ways of diversifying markets and products to reduce the dependence on just two markets.

- **Labour supply** - some plants report difficulty in meeting labour needs citing short seasons and changing demographics as factors to explain supply constraints. The full nature and extent of the issue are not well known. In light of demographic changes expected over the next decade, gaining greater insight into the issue would appear to be fundamental to any policy development.

BIBLIOGRAPHY

Ad Hoc Group of Fish Processors. November 2003. *Submission to Fish Processing Policy Review.*

Association of Seafood Producers. April 2006. *Price Submission to the Sanding Fish Price Setting Panel.*

Cascorbi, A. Monterey Bay Aquarium. February 2004. *Seafood Watch Seafood Report, Crabs, Volume V.*

Cashin, R. November 2005. Report of the Chairman RMS Review Committee.

Collins, J. F. November 1986. *The Economics of the Crab Fishery Newfoundland Region, 1979-85.*

Department of Fisheries and Aquaculture. *An Overview of Crab Production Newfoundland and Labrador (Draft).*

Dunne, Eric. December 2003. *Fish Processing Policy Review Final Report.*

Fish, Food and Allied Workers. April 2006. A presentation to the Standing Fish Price – Setting Panel. *For the Crab Fishery 2006.*

Fisheries and Oceans Canada. Canadian Science Advisory Secretariat Science Advisory Report. *Assessment of Eastern Nova Scotia (4VW) Snow Crab.* 2006.

Fisheries and Oceans Canada. Canadian Science Advisory Secretariat Science Advisory Report. *Assessment of the Estuary and Northern Gulf of St. Lawrence (Areas 13 to 17 and 12A, 12B and 12C) Snow Crab Stocks in 2006).* 2006.

Fisheries and Oceans Canada. Canadian Science Advisory Secretariat Science Advisory Report. *Assessment of Newfoundland and Labrador Snow Crab.* 2006.

Fisheries and Oceans Canada. Canadian Science Advisory Secretariat Science Advisory Report. *Southern Gulf of St. Lawrence Snow Crab (Areas 12 E and F).* 2006.

Fisheries and Oceans Canada. Canadian Science Advisory Secretariat Science Advisory Report. *Western Cape Breton Snow Crab (Area 19).* 2006.

Fisheries and Oceans Canada. *Co-Management in the Southern Gulf of St. Lawrence Snow Crab Fishery, Snow Crab Fishing Areas 12, 25, 26 1997 to 2002.*

Fisheries and Oceans Canada. DFO Gulf Region Fisheries Management Plan. *Area 19 Snow Crab Integrated Fisheries Management Plan 2001-2010.*

Fisheries and Oceans Canada. *Quebec Region Commercial Fishing Results, 2005 Season.*

Fisheries and Oceans Canada. *Species Quota Report.* Newfoundland Region Preliminary Data.

Fisheries Resource Conservation Council. June 2005. Strategic Conservation Framework for Atlantic Snow Crab. Report to the Ministry of Fisheries and Oceans. FRCC.05.R1.

Full Time Crab Fleet, NAFO Area 3L. April 1993. *Newfoundland Crab Fishery Resource Management and Allocations Policy*.

Gardner Pinfold Consulting Economists Limited. April 2003. *Economics of the Nova Scotia Crab Industry*.

Gardner Pinfold Consulting Economists Limited. September 1993. *The Impact of Newfoundland Processing and Licensing Regulations on the Landed price for Snow Crab*.

Gardner, M., J. Mullally, S. Beaton. February 2005. *Advisory Panel on the Eastern Nova Scotia Snow Crab Fishery*. A Report to the Hon. Geoff Regan, Ministry of Fisheries and Oceans.

International Foundation for the Conservation of Natural Resources Fisheries Committee. 2001. *Snow Crab: Hot Commodity/Hotter Political Weapon?* www.fisheries.ifcnr.com/article.cfm?NewsID=576.

Jones, D. W. October 2003. *A Review of the Fishing Industry Collective Bargaining Act – A Framework for Stability*.

Knapp, G. Institute of Social and Economic Research, University of Alaska Anchorage. May 2006. *Draft Report – Economic Impacts of BSAI Crab Rationalization on Kodiak Fishing Employment and Earnings and Kodiak Businesses – A Preliminary Analysis*.

LGL Limited, Canning & Pitt Associates, Inc., W. J. Gazey Research and Gardner Pinfold Consulting Economists Ltd. May 2002. *An Independent Review of the Snow Crab Fishery in Newfoundland and Labrador*. A report prepared for Fisheries Management Branch, Newfoundland Region, DFO St. John's, Newfoundland.

Sackton, J. March 2006. *Snow Crab Market Outlook: 2006. A Year to Avoid Risk*.

Sackton, J. Seafood.com, Inc. 2004. *Introduction to World Crab Markets – Maximizing Value from the Crab Fishery in Atlantic Canada*.

Sackton, J. Seafood.com, Inc. 2005. *Snow Crab Markets for 2005 – A Customer Revolt*.

Sackton, J. Seafood.com, Inc. Various reports 2004-2006. In Season Crab Marketing Pricing Report – Crab Market Report.

Standing Fish Price Setting Panel. 2006. *Snow Crab Fishery*.